Installation, Start-Up, and Service Instructions

CONTENTS

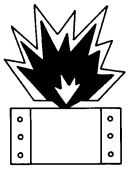
SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING



Disconnect gas piping from unit when leak testing at pressure greater than ½ psig. Pressures greater than ½ psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than ½ psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of ½ psig or less, a unit connected to such piping must be isolated by manually closing the gas valve.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

Unit is shipped in the vertical discharge configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight. See Fig. 1.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 2. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb, not to the unit.* The accessory thru-the-bottom power connection package must be installed before the unit is set on the roof curb. If field installed (through the roof curb) gas connections are desired, use factory supplied ¾ in. pipe coupling and gas plate assembly to mount the through the roof curb connection to the roof curb. Gas connections and power connections to the unit must be field installed after the unit is installed on the roof curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 2. Improperly applied gasket can result in air leaks and poor unit performance.

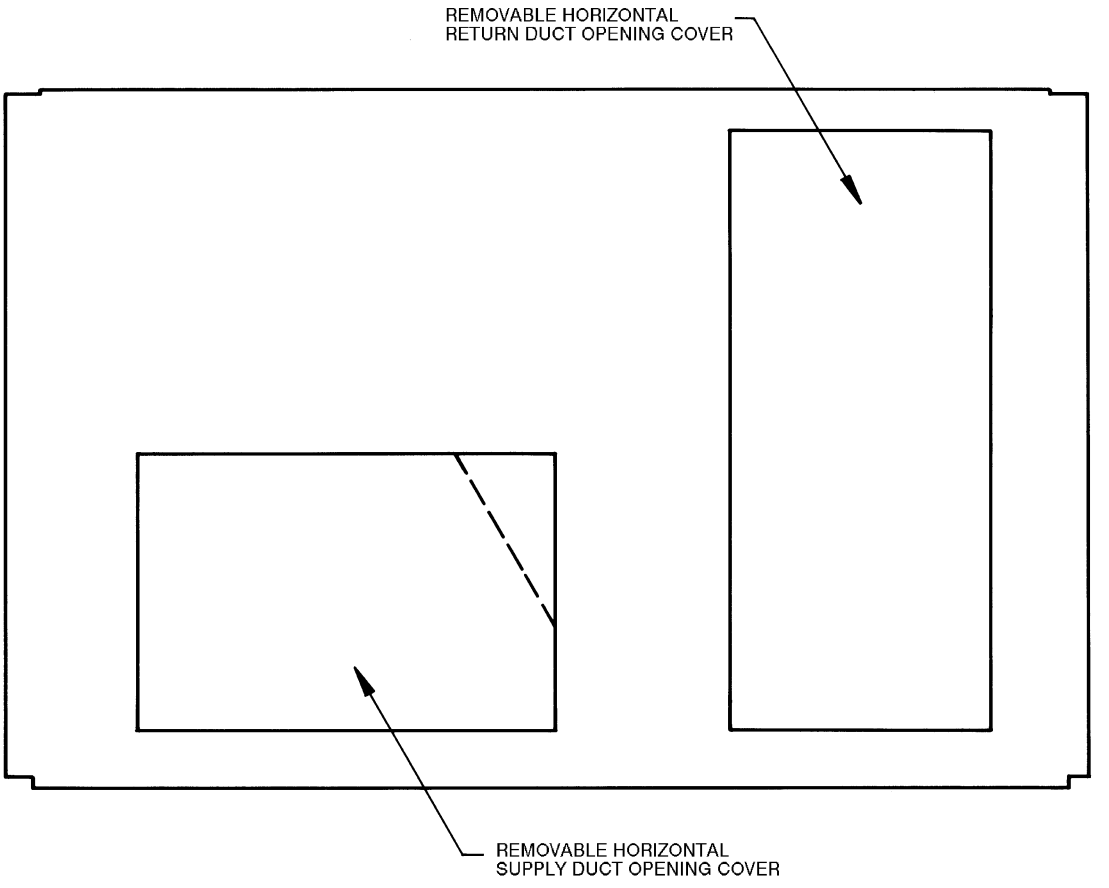


Fig. 1 — Horizontal Conversion Panels

Curb should be level. Unit leveling tolerances are shown in Fig. 3. This is necessary for unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Step 2 — Field Fabricate Ductwork — Secure all ducts to roof curb and building structure on vertical units. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return air static shall not exceed −.20 in. wg with PARABLADE, economizer −.35 in. wg with Varislide™ economizer or −.45 in. wg without economizer.

These units are designed for a minimum continuous return-air temperature of 50 F (dry bulb), or an intermittent operation down to 45 F (dry bulb), such as when used with a night set-back thermostat.

Step 3 — Install External Trap for Condensate Drain — The unit's 3/4-in. condensate drain connections are located at the bottom and side of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, make sure the plug in the alternate bottom connection is tight before installing the unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug from the bottom connection to the side connection. See Fig. 4A. The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4-in. deep and protect against freeze-up. See Fig. 4B. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

Step 4 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 5 for additional information.

Lifting holes are provided in base rails as shown in Fig. 6. Refer to rigging instructions on unit.

⚠ CAUTION

All panels must be in place when rigging.

CONNECTION SIZES

UNIT SIZE 48TJ	B	C	D ALT DRAIN HOLE	"E" GAS	POWER	CONTROL	CONNECTOR PACKAGE ACCESSORY
004-007	1′-9 11/16″ [551]	1′-4″ [406]	1 3/4″ [44.5]	3/4″ NPT	3/4″ NPT	1/2″ NPT	CRBTMPWR001A00 (Thru-the-Bottom)

ROOF CURB ACCESSORY	"A"	UNIT SIZE 48TJ
CRRFCURB001A00	1′-2″ [356]	004-007
CRRFCURB002A00	2′-0″ [610]	

NOTES:
1. Roof curb accessory is shipped unassembled.
2. Insulated panels.
3. Dimensions in [ ] are in millimeters.
4. Roof Curb: galvanized steel.
5. Attach ductwork to curb. (Flanges of duct rest on curb.)
6. Service clearance is 4 ft on each side.
7. Direction of airflow.

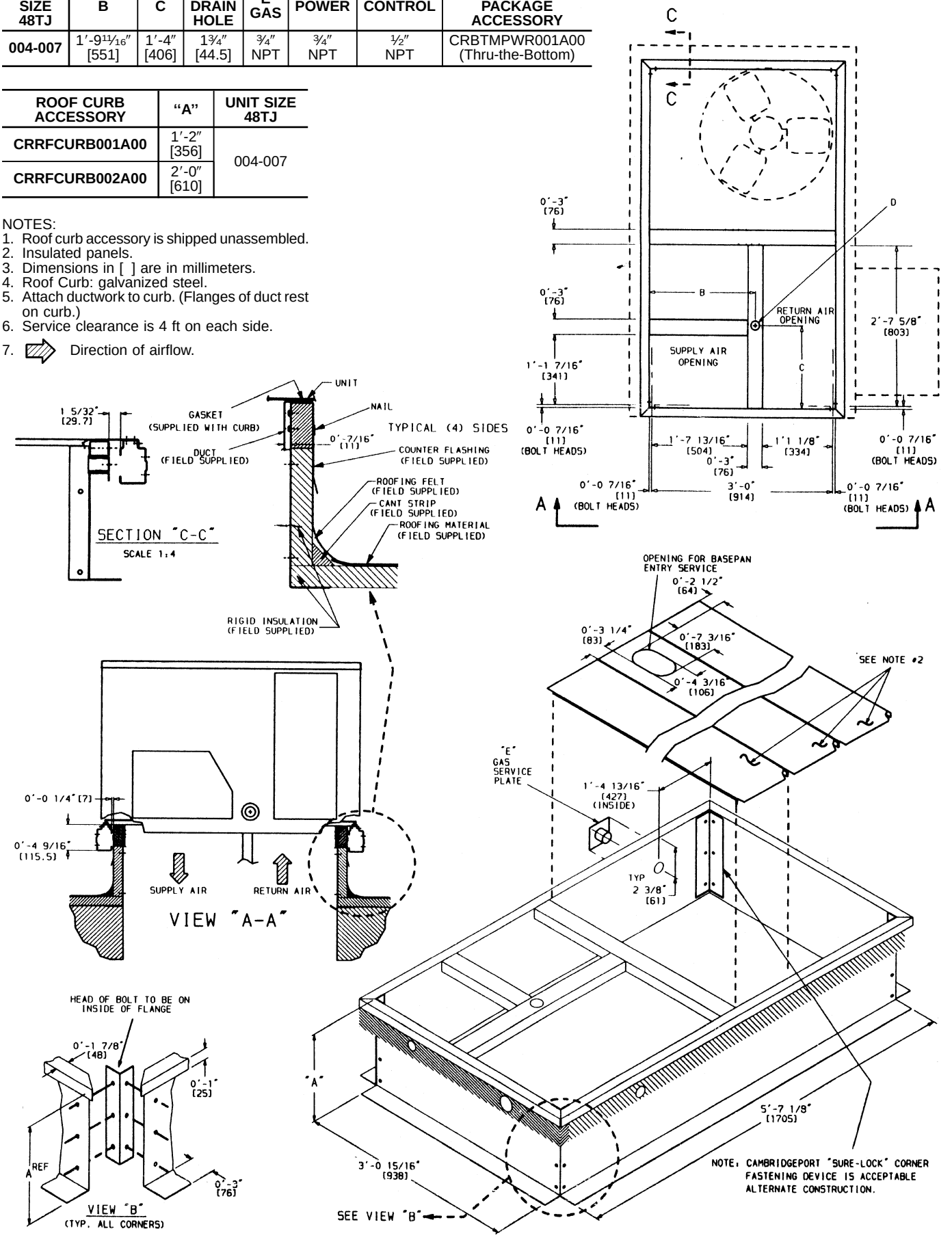


Fig. 2 — Roof Curb Dimensions

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 6. A properly positioned unit will have the following clearances between unit and roof curb: ¼-in. clearance between roof curb and base rails on each side and front of unit; 1$^{5}/_{32}$-in. clearance between roof curb and rear of unit. (See Fig. 2, section C-C.)

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Be sure that unit is installed such that snow will not block the combustion intake or flue outlet.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Flue vent discharge must have a minimum horizontal clearance of 4 ft from electric and gas meters, gas regulators, and gas relief equipment.

Minimum distance between unit and other electrically live parts is 48 inches.

Flue gas can deteriorate building materials. Orient unit such that flue gas will not affect building materials.

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, NFGC (National Fuel Gas Code), and ANSI (American National Standards Institute) Z223.1, and NFPA (National Fire Protection Association) 54 TIA-54-84-1. In Canada, installation must be in accordance with the CAN1-B149 installation codes for gas burning appliances.

After unit is in position, remove rigging skids and shipping materials.

Step 5 — Install Flue Hood — Flue hood is shipped screwed to the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 7.

Step 6 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1 entitled National Fuel Gas Code. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg or greater than 13.0 in. wg while unit is operating. On 48TJ005,006,007 high heat units, the gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13 in. wg while the unit is operating. For propane applications, the gas pressure must not be less than 5 in. wg or greater than 13 in. wg at the unit connection.

Size gas supply piping for 0.5 in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection. Support gas piping as shown in the table in Fig. 8. For example, a ¾-in. gas pipe must have one field-fabricated support beam every 8 ft. Therefore, an 18-ft long gas pipe would have a minimum of 2 support beams, a 48-ft long pipe would have a minimum of 6 support beams.

See Fig. 8 for typical pipe guide and locations of external manual main shutoff valve.

Step 7 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code), ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

DISCONNECT BOX LOCATION — The field-supplied disconnect box may be mounted on the unit's end panel or on the corner post. Mount disconnect box on the left side of the rating plate when mounting on the unit's end panel. Do not mount the disconnect box over the unit rating plate. When mounting disconnect box on corner post, secure disconnect box to corner post and condenser coil top cover. See Fig. 7.

A disconnect box mounting space is available when an optional or accessory condenser coil grille is used. Mount the disconnect on the sheet metal provided with the condenser coil grille. The sheet metal is located adjacent to the corner post on the left side of the power wiring access panel.

FIELD POWER SUPPLY — All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer *must* be rewired by moving the black wire from the 230-v orange wire on the transformer and connecting it to the 200-v red wire from the transformer. The end of the orange wire must then be insulated.

Refer to unit label diagram for additional information. Wiring leads are provided for field service. Use copper conductors only when splice connectors are used.

When installing units, provide a disconnect per NEC.

All field wiring must comply with NEC and local requirements. In Canada, electrical connections must be in accordance with CSA (Canadian Standards Association) C22.1 Canadian Electrical Code Part 1.

Install field wiring as follows:

1. Connect ground lead to chassis ground connection when using separate ground ties.
2. Install conduit between disconnect and side panel. Insert conduit through power supply knockout opening. See Fig. 9.
3. Connect power lines to power wiring leads.
4. Pigtails are provided for field power connections and are located inside the burner access panel. See Fig. 10 and 11. Use factory-supplied splices or Underwriters' Laboratories (UL) approved copper connector.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate (see Table 2). On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the legend for Table 2, Note 2 to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

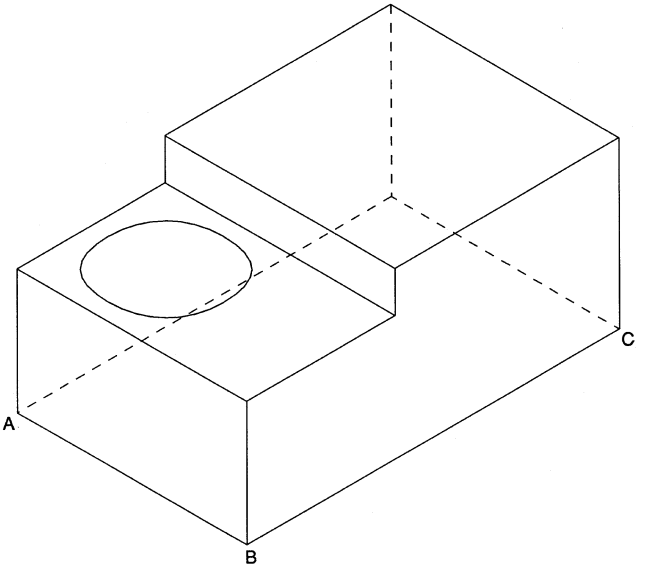
FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to installation instructions included with the accessory. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature in accordance with thermostat installation instructions. Connect thermostat wires to terminal board.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through connector on unit to low-voltage connections (shown in Fig. 12).

NOTE: For wire runs up 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

Feed control wires through the raceway located between the condenser coil top cover and burner side panel. See Fig. 10. Connect control wires to corresponding screw terminals, the low-voltage connections located inside low-voltage access panel. See Fig. 12 for connections. The low-voltage connections provide the UL required clearance between high- and low-voltage wiring.

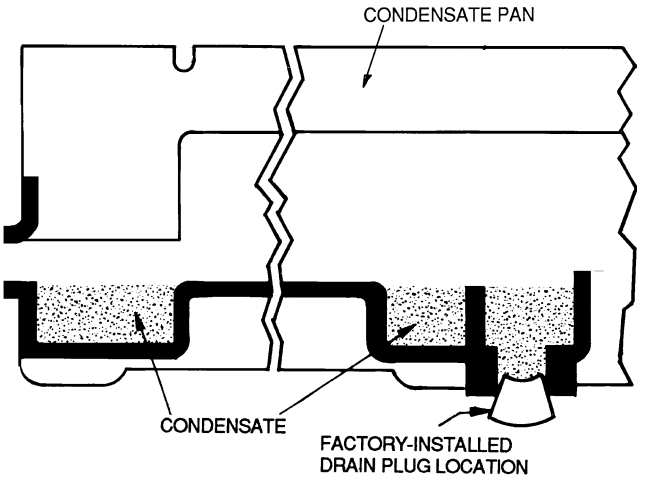
HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at .14 amp for the first stage and .14 amp for second-stage heating, when available.



MAXIMUM ALLOWABLE DIFFERENCE (in.)

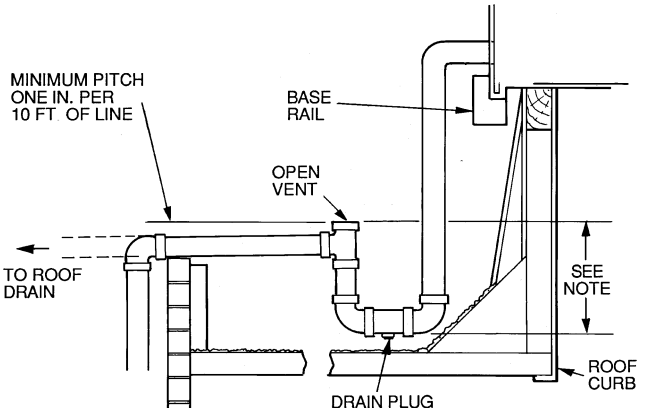
A-B	B-C	A-C
0.5	1.0	1.0

Fig. 3 — Unit Leveling Tolerances



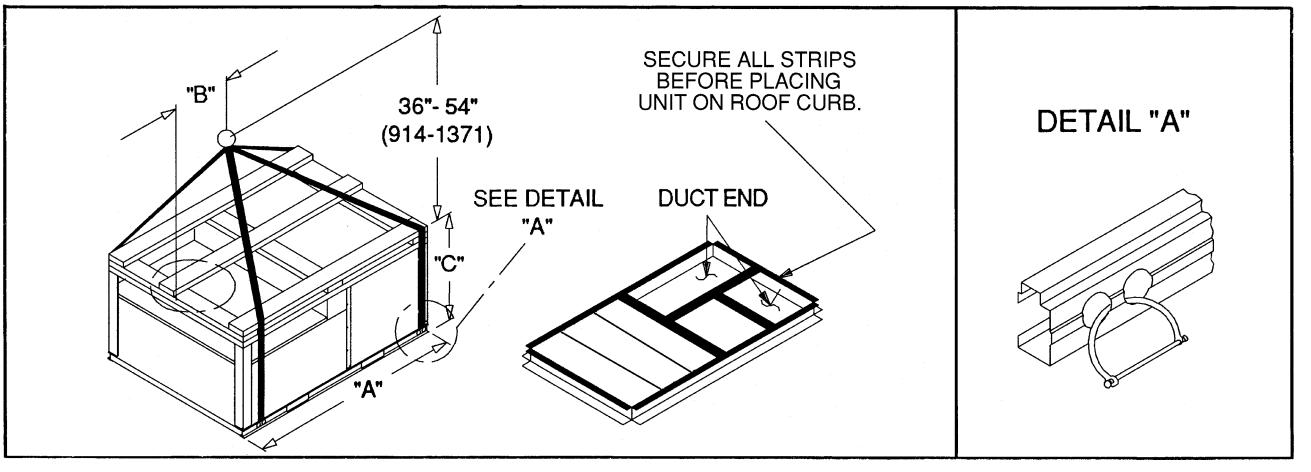
NOTE: Drain plug is shown in factory-installed position.

Fig. 4A — Internal Trap Condensate Drain



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

Fig. 4B — External Trap Condensate Drain



NOTES:
1. Dimensions in ( ) are in millimeters.
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Unit weights do not include economizer. See Table 1 for economizer weights.

⚠ CAUTION

All panels must be in place when rigging.

UNIT	MAX WEIGHT		"A"		"B"		"C"	
	Lb	Kg	in.	mm	in.	mm	in.	mm
48TJE/TJF004	510	231	73.69	1872	37.50	953	33.35	847
48TJD/TJE/TJF005	520	236						
48TJD/TJE/TJF006	540	245						
48TJD/TJE/TJF007	615	279						

Fig. 5 — Rigging Details

Table 1 — Physical Data

BASE UNIT 48		TJE/TJF004	TJD/TJE/TJF005	TJD/TJE/TJF006	TJD/TJE/TJF007
NOMINAL CAPACITY (tons)		3	4	5	6
OPERATING WEIGHT (lb)					
Unit		460	470	490	565
Varislide™ Economizer		34	34	34	34
PARABLADE Economizer		42	42	42	42
Roof Curb		115	115	115	115
COMPRESSOR		Hermetic (Reciprocating)			
Quantity		1	1	1	1
Oil (oz)		50	50	50	65
REFRIGERANT TYPE		R-22			
Operating Charge (lb-oz)		3-6	4-11	5-13	9-0
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Rows...Fins/in.		1...17	1...17	1...17	2...17
Total Face Area (sq ft)		7.36	11.39	13.19	10.42
CONDENSER FAN		Propeller Type			
Nominal Cfm		3500	4000	4000	4000
Quantity...Diameter (in.)		1...22.0	1...22.0	1...22.0	1...22.0
Motor Hp...Rpm		¼...1100	¼...1100	¼...1100	¼...1100
Watts Input (Total)		325	325	325	325
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol™ Feed Device			
Rows...Fins/in.		2...15	2...15	3...15	4...15
Total Face Area (sq ft)		4.17	5.5	5.5	5.5
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)	**Std**	1...10 x 10	1...10 x 10	1...11 x 10	1...10 x 10
	Alt	1...10 x 10	1...10 x 10	1...10 x 10	—
Type Drive	**Std**	Direct	Direct	Direct	Belt
	Alt	Belt	Belt	Belt	—
Nominal Cfm	**Std**	1200	1600	2000	2400
	Alt	1200	1600	2000	—
Maximum Continuous Bhp	**Std**	.34	.75	1.20	2.40
	Alt	1.00	1.00	1.80	—
Motor Frame Size	**Std**	48	48	48	56
	Alt	48	48	56	—
Nominal Rpm High/Low	**Std**	860/800	1075/970	1075/970	—
	Alt	—	—	—	—
Fan Rpm Range	**Std**	—	—	—	1070-1460
	Alt	760-1090	840-1185	900-1300	—
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	**Std**	—	—	—	2.8/3.8
	Alt	1.9/2.9	1.9/2.9	2.4/3.4	—
Nominal Motor Shaft Diameter (in.)	**Std**	½	½	½	⅝
	Alt	½	½	½	—
Fan Pulley Pitch Diameter (in.)	**Std**	—	—	—	4.5
	Alt	4.5	4.0	4.5	—
Belt, Quantity...Type...Length (in.)	**Std**	—	—	—	1...A...40
	Alt	1...A...39	1...A...36	1...A...39	—
Pulley Center Line Distance (in.)	**Std**	—	—	—	14.7-15.5
	Alt	10.0-12.4	10.0-12.4	14.7-15.5	—
Speed Change per Full Turn of Movable Pulley Flange (rpm)	**Std**	—	—	—	80
	Alt	65	70	80	—
Movable Pulley Maximum Full Turns From Closed Position	**Std**	—	—	—	5
	Alt	5	5	5	—
Factory Setting	**Std**	—	—	—	3
	Alt	3	3	3	—
Factory Speed Setting (rpm)	**Std**	—	—	—	1225
	Alt	890	980	1060	—
Fan Shaft Diameter at Pulley (in.)		⅝	⅝	⅝	⅝

LEGEND

Bhp — Brake Horsepower

*Rollout switch is manual reset.
†The 48TJD005-007 and 48TJE004 (74,000 Btuh) units have 2 burners. The 48TJE005-007 and 48TJF004 (115,000 Btuh) units and the 48TJF005-007 (150,000 Btuh) units have 3 burners.
**Indicates a FIOP (factory-installed option).
††Requires an optional/accessory controls upgrade kit.

Table 1 — Physical Data (cont)

BASE UNIT 48	TJE/TJF004	TJD/TJE/TJF005	TJD/TJE/TJF006	TJD/TJE/TJF007
FURNACE SECTION				
Rollout Switch Cutout Temp (F)*	195	195	195	195
Burner Orifice Diameter (in. ...drill size)†				
Natural Gas	.113...33	.113...33/ .113...33/ .129...30	.113...33/ .113...33/ .129...30	.113...33/ .113...33/ .129...30
Liquid Propane**	.082...45	.082...45/ .082...45/ .102...38	.082...45/ .082...45/ .102...38	.082...45/ .082...45/ .102...38
Thermostat Heat Anticipator Setting (amps)				
208/230/460 v Stage 1	.14	.14	.14	.14
Stage 2	.14	.14	.14	.14
Gas Input (Btuh) Stage 1	74,000/ 82,000	74,000/ 115,000/ 120,000	74,000/ 115,000/ 120,000	74,000/ 115,000/ 120,000
Stage 2	—/ 115,000	—/ —/ 150,000	—/ —/ 150,000	—/ —/ 150,000
Efficiency (Steady State) (%)	80	80	80	80
Temperature Rise Range	25-55/ 55-85	25-55/ 35-65/ 50-80	25-55/ 35-65/ 50-80	25-55/ 35-65/ 50-80
Manifold Pressure (in. wg)				
Natural Gas	3.5	3.5	3.5	3.5
Liquid Propane**	3.5	3.5	3.5	3.5
Gas Valve Quantity	1	1	1	1
Field Gas Connection Size (in.)	½	½	½	½
HIGH-PRESSURE SWITCH (psig)††				
Standard Compressor	450 ± 50			500 ± 50
Internal Relief (Differential)				
Cutout	428			428
Reset (Auto.)	320			320
LOW-PRESSURE/LOSS-OF-CHARGE SWITCH (psig)††				
Cutout	7 ± 3			
Reset (Auto.)	22 ± 7			
FREEZE-PROTECTION THERMOSTAT (F)††				
Opens	30 ± 5			
Closes	45 ± 5			
OUTDOOR-AIR INLET SCREENS	Cleanable			
Quantity...Size (in.)	1...20 x 24 x 1			
RETURN-AIR FILTERS	Throwaway			
Quantity...Size (in.)	2...16 x 25 x 2			

LEGEND

Bhp — Brake Horsepower

*Rollout switch is manual reset.

†The 48TJD005-007 and 48TJE004 (74,000 Btuh) units have 2 burners. The 48TJE005-007 and 48TJF004 (115,000 Btuh) units and the 48TJF005-007 (150,000 Btuh) units have 3 burners.

**Indicates a FIOP (factory-installed option).

††Requires an optional/accessory controls upgrade kit.

UNIT	STD. UNIT WEIGHT		ECONOMIZER WEIGHT				CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
			Varislide™		PARABLADE									
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
48TJF/TJE004	460	209	34	15.4	42	19.1	140	63.5	105	47.6	159	72.1	56	25.4
48TJD/TJE/TJF005	470	213	34	15.4	42	19.1	142	64.4	106	48.1	162	73.5	60	27.2
48TJD/TJE/TJF006	490	222	34	15.4	42	19.1	150	68.0	115	52.2	160	72.6	65	29.5
48TJD/TJE/TJF007	565	256	34	15.4	42	19.1	165	74.8	136	61.7	200	90.7	64	29.0

LEGEND

LED — Light-Emitting Diode

*Indicates horizontal center of gravity.

†Indicates vertical center of gravity.

NOTES:

1. Dimensions in [ ] are in millimeters.
2. Center of Gravity.
3. Direction of airflow.
4. On vertical discharge units, ductwork should be attached to accessory roof curb only. For horizontal discharge units, field-supplied flanges should be attached to horizontal openings. All ductwork should be attached to the flanges.
5. Minimum clearances (local codes or jurisdiction may prevail):
   a. Between unit, flue side, and combustible surfaces, 36 inches.
   b. Bottom of unit to combustible surfaces (when not using curb) 1 inch. Bottom of base rail to combustible surfaces (when not using curb) 0 inches.
   c. Condenser coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
   d. Overhead, 60 in. to assure proper condenser fan operation.
   e. Between units, control box side, 42 in. per NEC (National Electrical Code).
   f. Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
   g. Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
   h. Horizontal supply and return end, 0 inches.
6. With the exception of the clearance for the condenser coil and combustion side as stated in notes 5a, b, and c, a removable fence or barricade requires no clearance.
7. Units may be installed on combustible floors made from wood or class A, B, or C roof covering material if set on baserail.

	CONNECTION SIZES
A	1 1/16″ Dia. (27) Field Power Supply Hole
B	3/4″–14 NPT Condensate Drain
C	1/2″–14 NPT Gas Connection

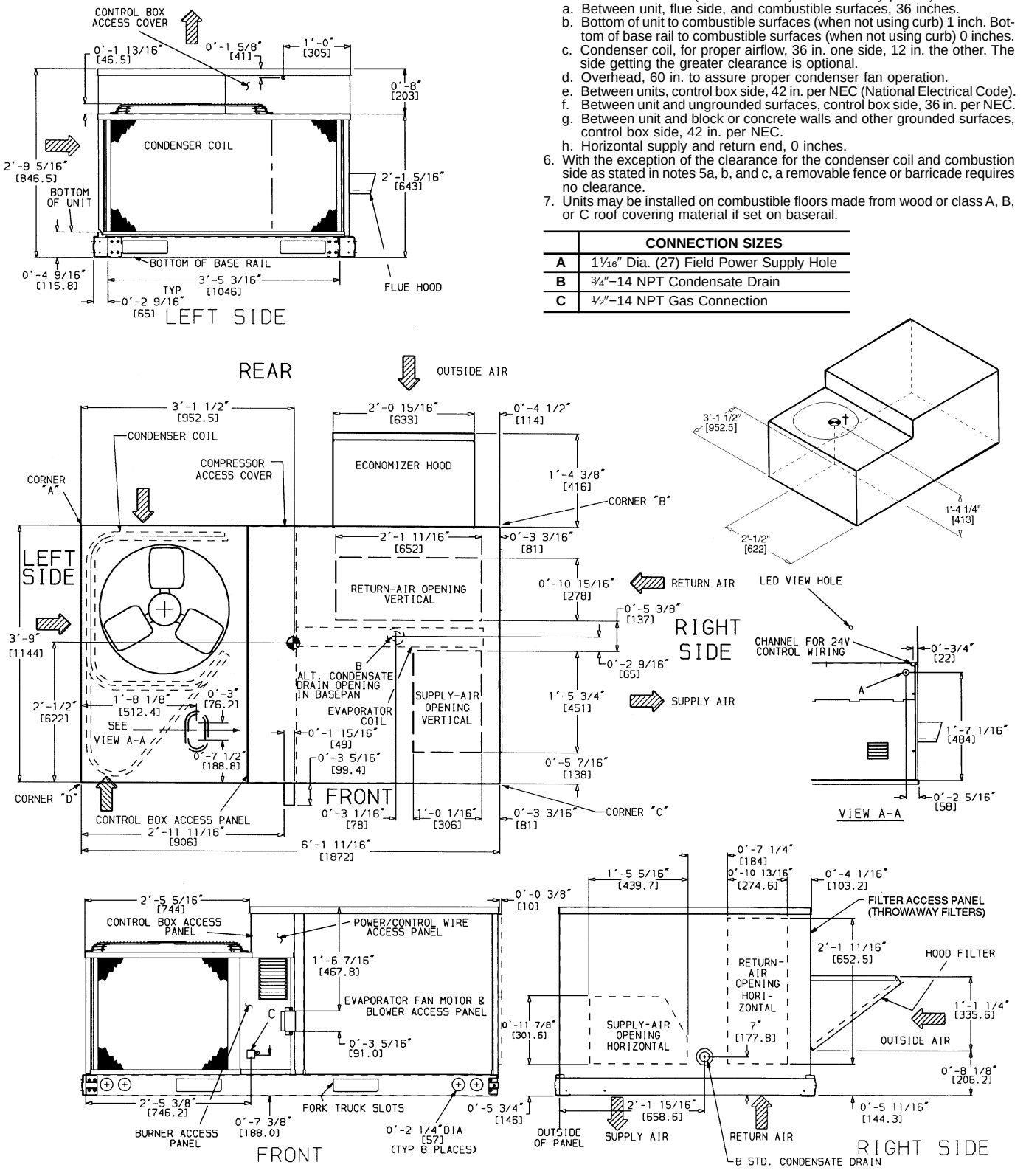


Fig. 6 — Base Unit Dimensions

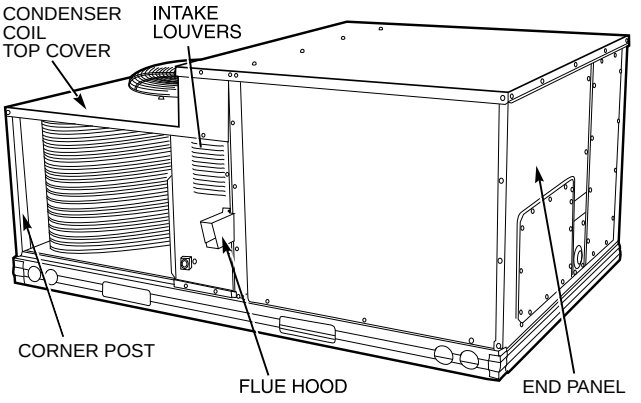
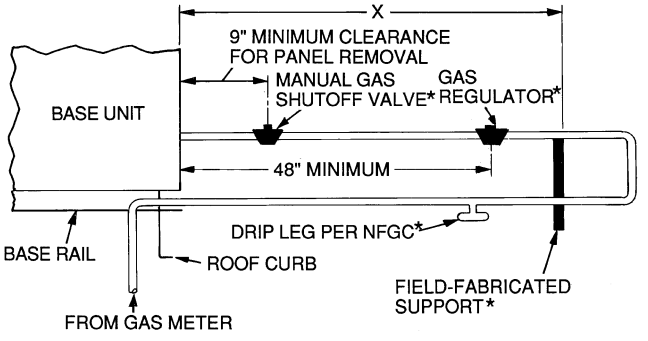


Fig. 7 — Flue Hood Details



LEGEND

NFGC — National Fuel Gas Code

*Field supplied.

NOTE: Follow all local codes.

SPACING OF SUPPORTS

STEEL PIPE NOMINAL DIAMETER (in.)	X DIMENSIONS (feet)
½	6
¾ or 1	8
1¼ or larger	10

Fig. 8 — Gas Piping Guide (With Accessory Thru-the-Curb Service Connections)

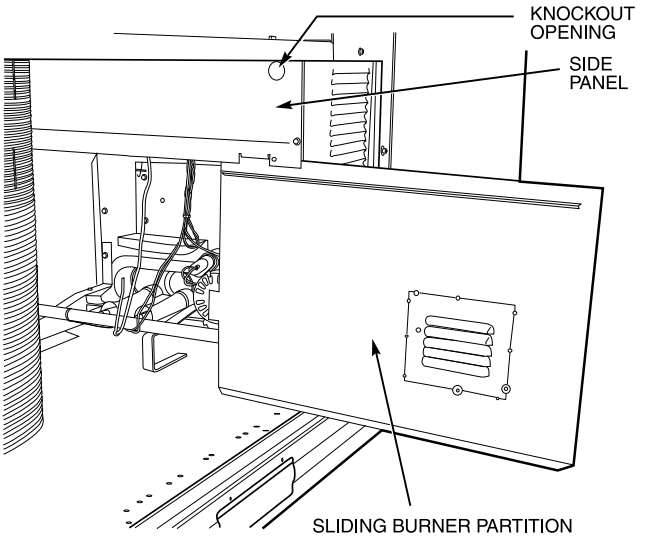
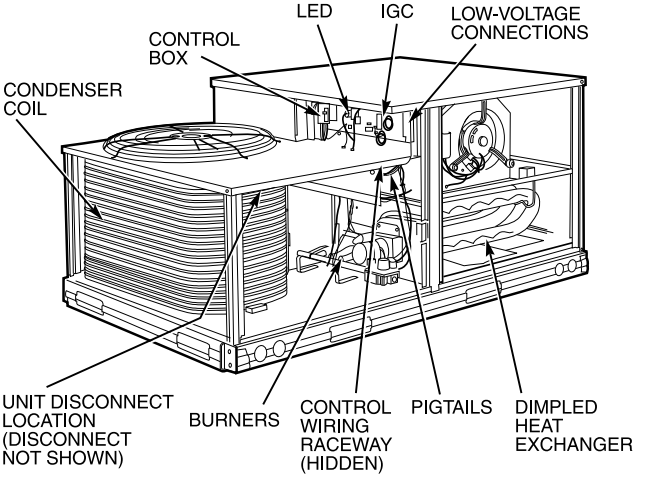


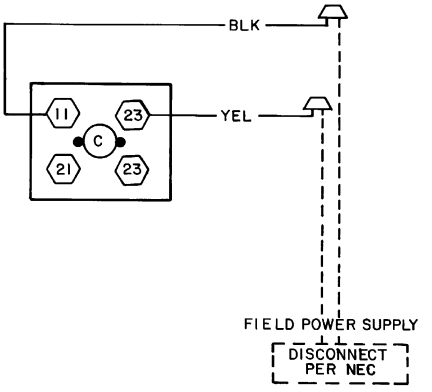
Fig. 9 — Conduit Installation



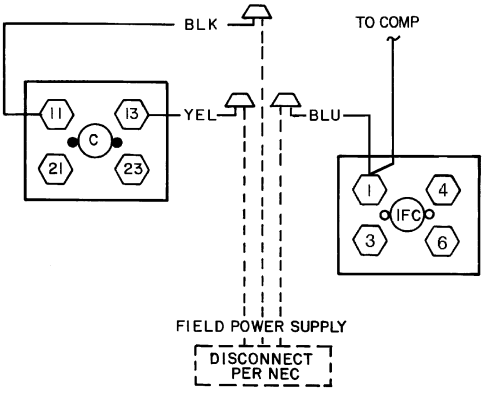
LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

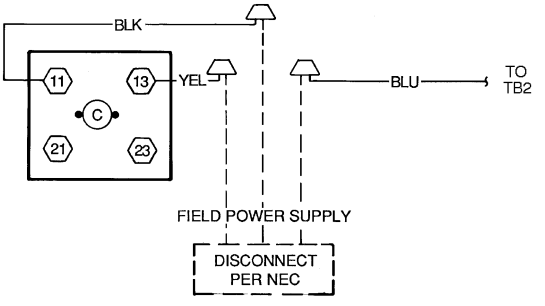
Fig. 10 — Component Location



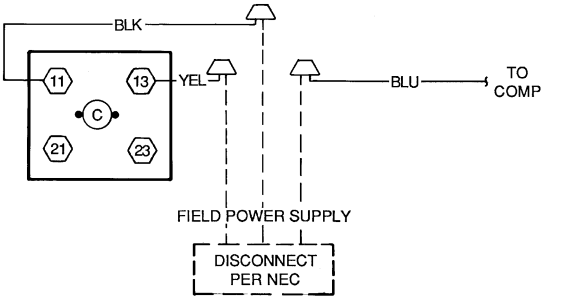
208/230-1-60



208/230-3-60
460-3-60
(SIZE 007 ONLY)



575-3-60
(SIZE 007 ONLY)

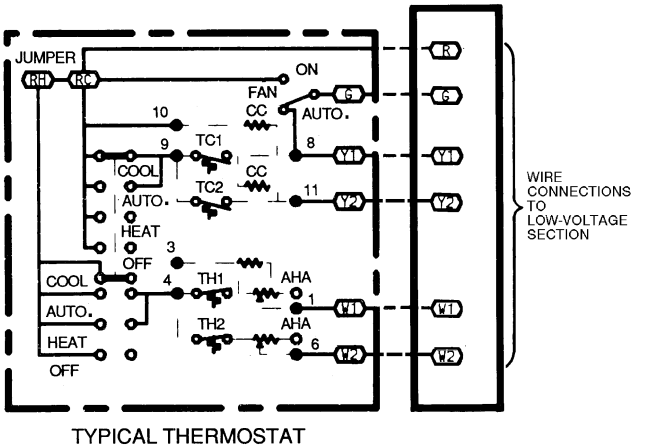


208/230-3-60
575-3-60, 460-3-60
(SIZES 004-006)

LEGEND

C — Contactor
COMP — Compressor
NEC — National Electrical Code
TB — Terminal Block

Fig. 11 — Power Wiring Connections



TYPICAL THERMOSTAT

LEGEND

AHA — Adjustable Heat Anticipator
CC — Cooling Compensator
TC — Thermostat-Cooling
TH — Thermostat-Heating
– – – – Field Wiring
——— Factory Wiring

NOTES:
1. Connect Y2 when unit is equipped with an economizer.
2. Connect W2 when unit is equipped with two stages of heat.

Fig. 12 — Low-Voltage Connections

Table 2 — Electrical Data

UNIT	NOMINAL V-PH-HZ	IFM TYPE	VOLTAGE RANGE		COMPR (each)		OFM	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY		DISCONNECT SIZE*	
			Min	Max	RLA	LRA	FLA	FLA	FLA	MCA	MOCP†	FLA	LRA
48TJ004 (3 Tons)	208/230-1-60	Std	187	254	16.9	86.7	1.4	2.8	.57	25.3/25.3	35/35	24/24	97/97
		Alt						4.9		27.4/27.4	35/35	27/27	102/102
	208/230-3-60	Std	187	254	11.7	65.1	1.4	2.8	.57	18.8/18.8	25/25	18/18	76/76
		Alt						4.9		20.9/20.9	25/25	21/21	80/80
	460-3-60	Std	414	508	5.1	32.8	0.8	1.3	.30	8.5	15	8	38
		Alt						2.1		9.3	15	9	41
	575-3-60	Std	518	632	4.1	37.0	0.8	1.3	.30	7.4	15	7	32
		Alt						2.1		6.7	15	7	32
48TJ005 (4 Tons)	208/230-1-60	Std	187	254	23.0	110.0	1.4	3.5	.57	33.7/33.7	40/40	32/32	122/122
		Alt						4.9		35.1/35.1	40/40	34/34	125/125
	208/230-3-60	Std	187	254	15.3	92.0	1.4	3.5	.57	24.0/24.0	30/30	23/23	104/104
		Alt						4.9		25.4/25.4	30/30	25/25	107/107
	460-3-60	Std	414	508	7.0	46.0	0.8	1.8	.30	11.4	15	11	52
		Alt						2.1		11.7	15	11	54
	575-3-60	Std	518	632	5.8	44.0	0.8	1.8	.30	9.3	15	9	49
		Alt						2.1		9.6	15	9	51
48TJ006 (5 Tons)	208/230-1-60	Std	187	254	30.5	141.0	1.4	5.9	.57	42.7/42.7	50/50	43/43	155/155
		Alt						8.8		48.3/48.3	60/60	47/47	178/178
	208/230-3-60	Std	187	254	17.7	110.0	1.4	5.9	.57	29.4/29.4	35/35	29/29	124/124
		Alt						5.8		29.3/29.3	35/35	29/29	145/145
	460-3-60	Std	414	508	8.6	55.0	0.8	3.2	.30	14.8	20	15	63
		Alt						2.6		14.2	20	14	73
	575-3-60	Std	518	632	6.4	50.0	0.8	3.2	.30	12.0	15	12	52
		Alt						2.6		11.4	15	12	62
48TJ007 (6 Tons)	208/230-3-60	Std	187	254	20.9	142.0	1.4	5.8	.57	33.3/33.3	40/40	32/32	187/187
	460-3-60	Std	414	508	9.9	72.0	0.6	2.6	.30	15.6	20	15	94
	575-3-60	Std	518	632	7.9	58.0	0.6	2.6	.30	14.4	15	12	76

IMPORTANT: Optional, alternate evaporator-fan motor and drive are not available for 48TJ007 units. Contact your local Carrier representative for more information about field-installed motors.

LEGEND

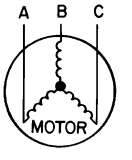
COMPR — Compressor
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Used to determine minimum disconnect per NEC.
†Fuse or HACR circuit breaker.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian Standards Association (CSA) units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

NOTE: The 575-v units are CSA only.

Determine maximum deviation from average voltage.
(AB) 457 − 452 = 5 v
(BC) 464 − 457 = 7 v
(AC) 457 − 455 = 2 v

Maximum deviation is 7 v.

Determine percent voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Step 8 — Make Outdoor-Air Adjustments and Install Outdoor-Air Hood

MANUAL OUTDOOR-AIR DAMPER — The outdoor-air hood and screen are attached to the basepan at the bottom of the unit for shipping.

Assembly:

1. Determine quantity of ventilation required for building. Record amount for use in Step 8.
2. Remove and save evaporator coil access panel and screws. See Fig. 13.
3. Separate hood and screen from basepan by removing the 4 screws securing them. Save all screws.
4. Replace evaporator coil access panel.
5. Place hood on front of evaporator coil access panel. See Fig. 14 for hood details. Secure top of hood with the 4 screws removed in Step 3. See Fig. 15.
6. Remove and save 6 screws (3 on each side) from sides of the manual outdoor-air damper.
7. Align screw holes on hood with screw holes on side of manual outdoor-air damper. See Fig. 14 and 15. Secure hood with 6 screws from Step 6.
8. Adjust minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper blade. See Fig. 13. Slide blade vertically until it is in the appropriate position determined by Fig. 16. Tighten screws.
9. Remove and save screws currently on sides of hood. Insert screen. Secure screen to hood using the screws. See Fig. 15.

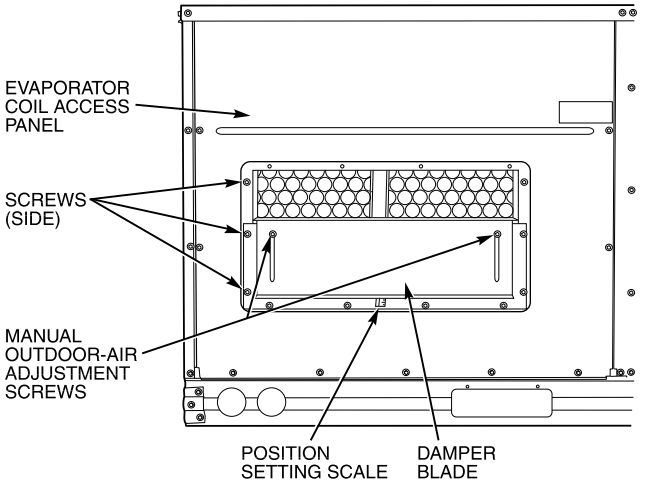


Fig. 13 — Damper Panel with Manual Outdoor-Air Damper Installed

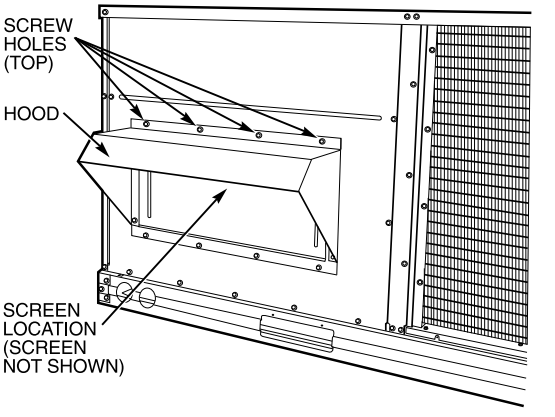


Fig. 15 — Outdoor-Air Damper with Hood Attached

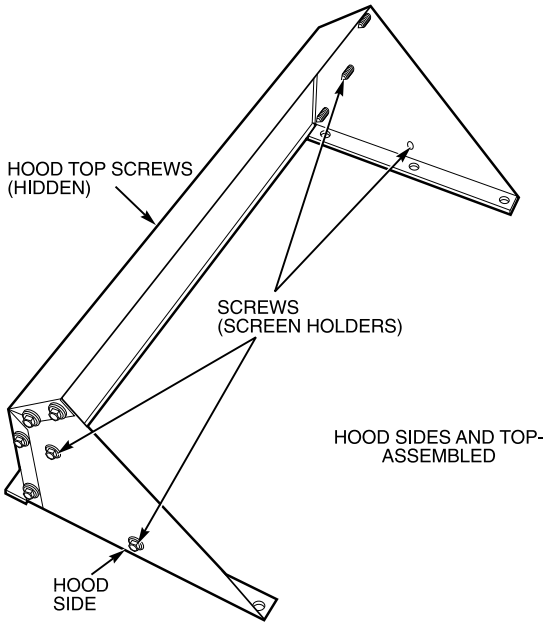


Fig. 14 — Outdoor-Air Hood Details

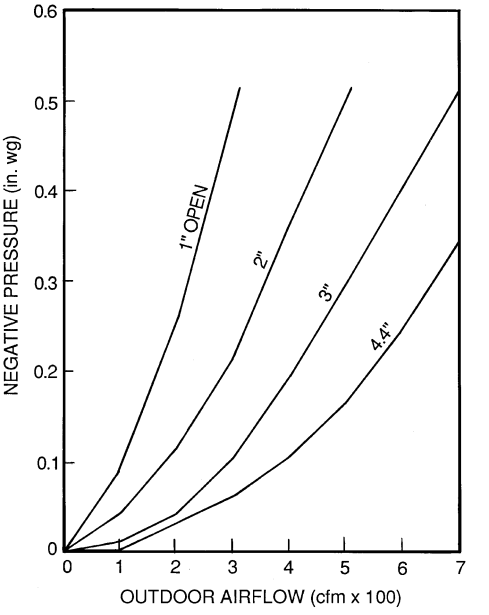


Fig. 16 — Position Setting

OPTIONAL VARISLIDE ™ ECONOMIZER — The optional economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. If unit is to be used for vertical discharge application, discard this plate.

Assembly:

1. Determine if ventilation air is required in building. If so, determine minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 7.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 17. Remove optional outdoor-air damper hood package from filter section.

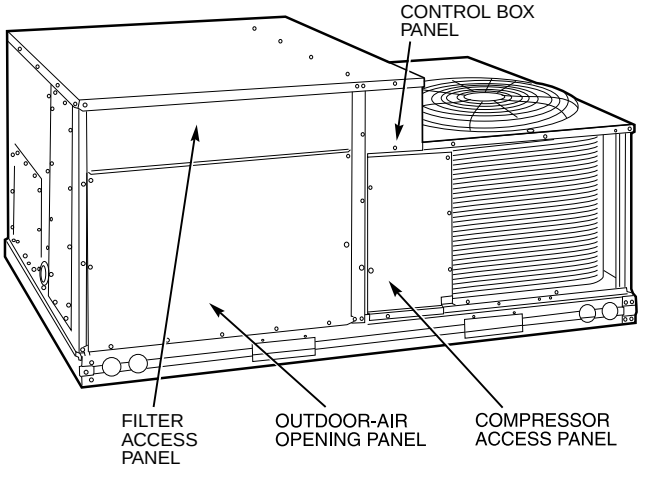


Fig. 17 — Typical Access Panel Locations

3. Assemble outdoor-air hood top and side plates as shown in Fig. 18. Install seal strips on hood top and sides. Put aside screen retainer and screws for later assembly. *Do not attach hood to unit at this time.*
4. To convert to horizontal discharge application:
   a. Rotate economizer 90 degrees until the economizer motor faces the condenser section (see Fig. 19).
   b. Rotate the barometric relief damper cover 90 degrees.
   c. Install horizontal discharge block-off plate over the opening on the access panel. (Block-off plate MUST be installed before installing hood assembly.) See Fig. 20.
5. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 21.
6. If ventilation air is not required, proceed to Step 8. If ventilation air is required, determine minimum position setting for required airflow. See Fig. 22. Adjust minimum position setting by adjusting the screws on the position setting bracket. Slide bracket until the top screw is in the position determined by Fig. 22. Tighten screws.
7. Remove tape from outdoor-air thermostat (OAT). Fasten OAT to inside of hood using screws and speed clips provided. See Fig. 23. Make sure OAT terminals are positioned up.
8. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged.
9. Fasten hood top and side plate assembly (Fig. 18) to outdoor-air opening panel with screws provided.
10. Place knob supplied with economizer on OAT. See Fig. 23. Set for 3° F below indoor room thermostat setting. If accessory enthalpy control (EC) is used in place of OAT, see instructions shipped with EC for installation and adjustment. See Fig. 23.
11. Connect OAT per Fig. 24.
12. Slide outdoor-air inlet screen into screen track on hood side plate. While holding screen in place, fasten screen retainer to hood using screws provided.

NOTE: Refer to Fig. 25 for economizer barometric relief damper characteristics.

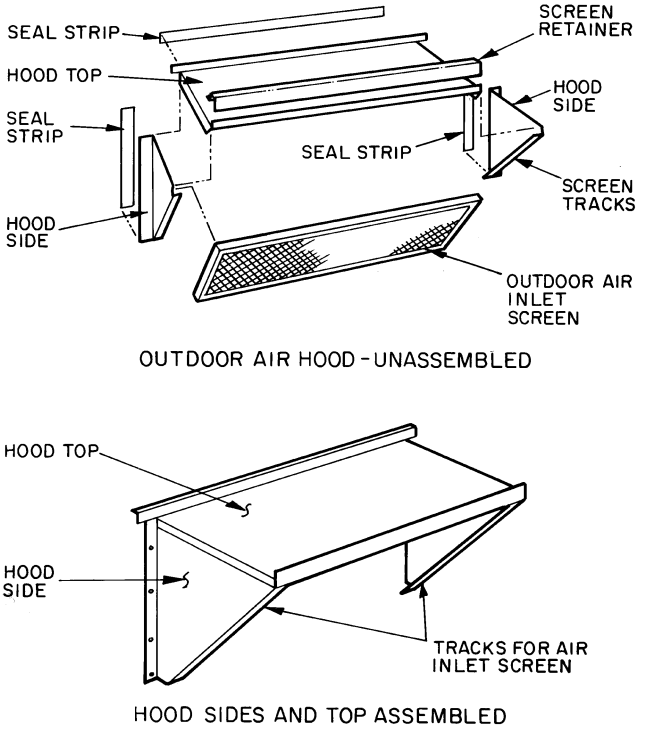


Fig. 18 — Outdoor-Air Hood Details

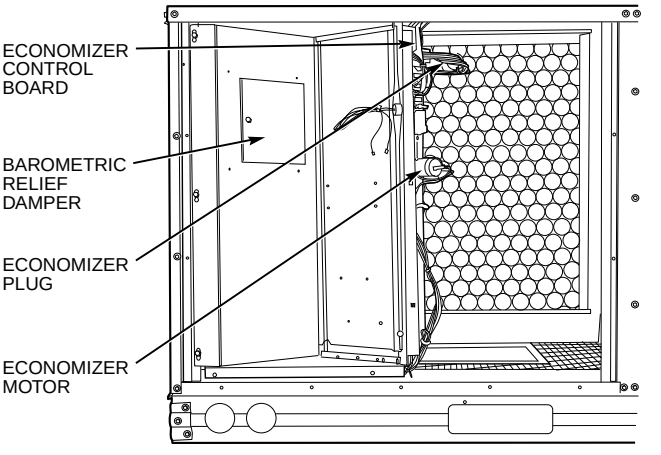


Fig. 19 — Horizontal Varislide™ Economizer Installation

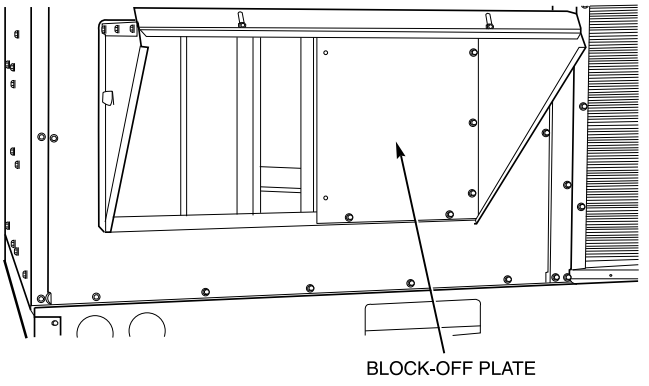
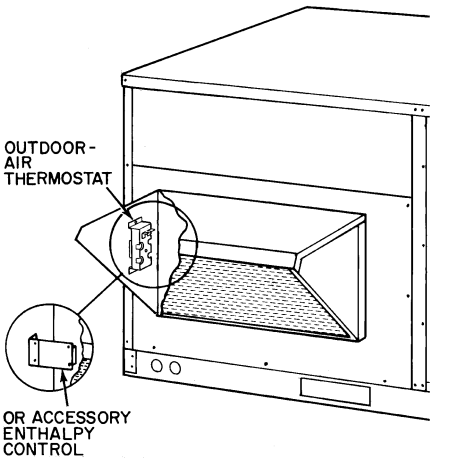


Fig. 20 — Horizontal Discharge Block-Off Plate



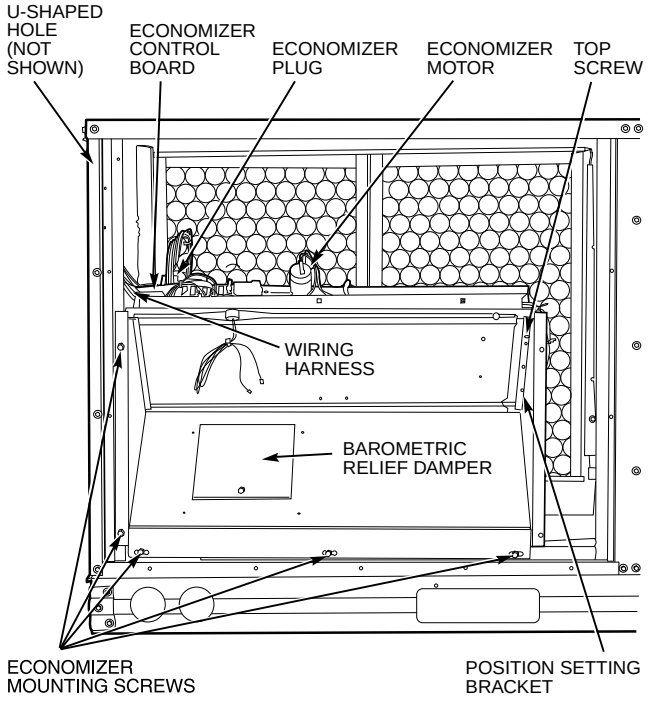
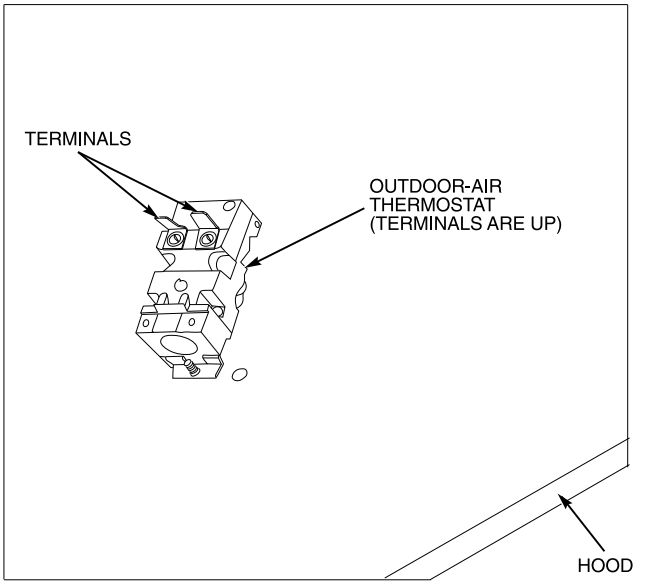
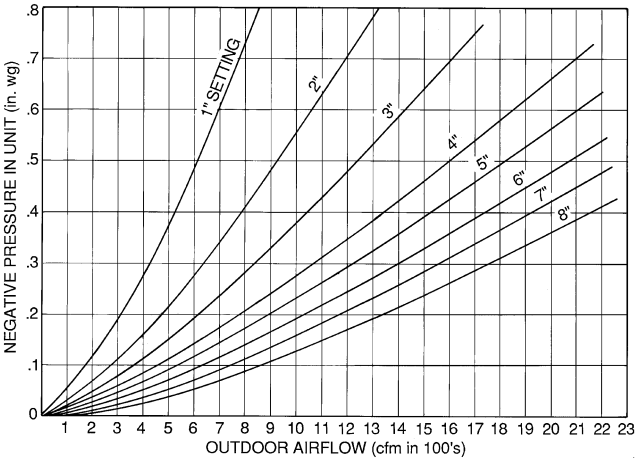


Fig. 21 — Varislide™ Economizer Installed in Unit





EXAMPLE:
Given — Negative Pressure . . . . . 0.2 in. wg
Outdoor Air . . . . . 900 cfm
Determine — Setting = 5 in.

Fig. 22 — Varislide Economizer Minimum Position Setting

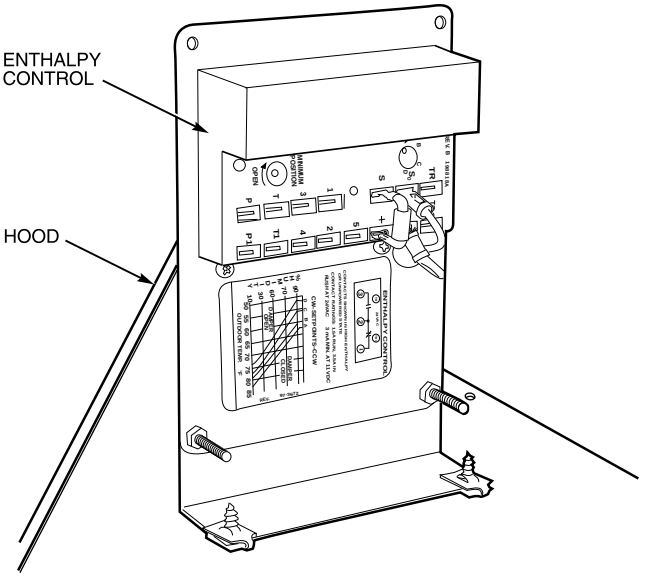
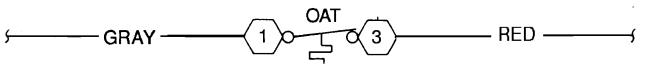


Fig. 23 — Outdoor-Air Thermostat/Enthalpy Control Installation



LEGEND

OAT — Outdoor-Air Thermostat

NOTE: See unit wiring diagram for details.

Fig. 24 — Wiring Connections for Outdoor-Air Thermostat

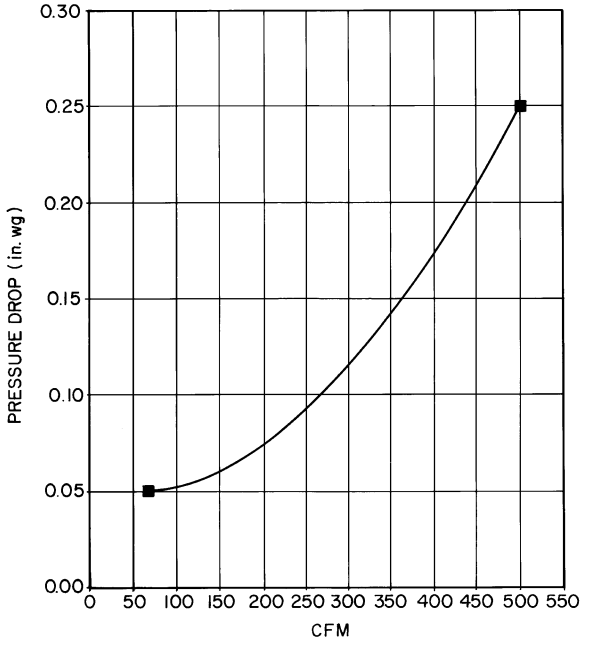


Fig. 25 — Varislide™ Economizer Barometric Relief Damper Characteristics

OPTIONAL PARABLADE ECONOMIZER — The optional PARABLADE economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. The PARABLADE economizer can only be used for vertical discharge applications. Discard this plate.

Assembly

1. Determine if ventilation air is required in building. If so, determine minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 5.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 17.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 18. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 26.
5. If ventilation air is not required, proceed to Step 6. If ventilation air is required, perform the following:
   a. Make sure the factory-installed jumper is in place across terminals P and P1 on the economizer logic module. T and T1 should be disconnected during adjustment.
   b. The 2 potentiometers with slots for adjustment are located on the face of the economizer logic module. Turn the lower potentiometer fully clockwise. The dampers should be fully closed. Turn the potentiometer gradually counterclockwise until the desired position is reached.
   c. Connect T and T1 to the 24-v power supply.
   d. After installation is complete, calculate the minimum airflow across the economizer. To calculate the minimum airflow, the following data is needed: total cfm (cfm_3), temperature of the total cfm (T_3), temperature of the return air (T_2), and temperature of the entering outside air (T_1). Cfm_1 is the outside air (minimum) cfm.

      Insert the data into the following equations:

      $$\frac{T_1\ (cfm_1) + T_2\ (cfm_2)}{cfm_3} = T_3$$

      $$cfm_2 = (cfm_3 - cfm_1)$$

      Therefore:

      $$\frac{T_1\ (cfm_1) + T_2\ (cfm_3 - cfm_1)}{cfm_3} = T_3$$

      Further derivation reveals the following formula for airflow:

      $$cfm_1 = \frac{(T_3 - T_2)\ cfm_3}{(T_1 - T_2)}$$

      Use this equation to determine cfm_1, which is the minimum airflow across the economizer.

      If cfm_1 does not match the desired minimum airflow from Step 1, readjust the minimum position setting screw.

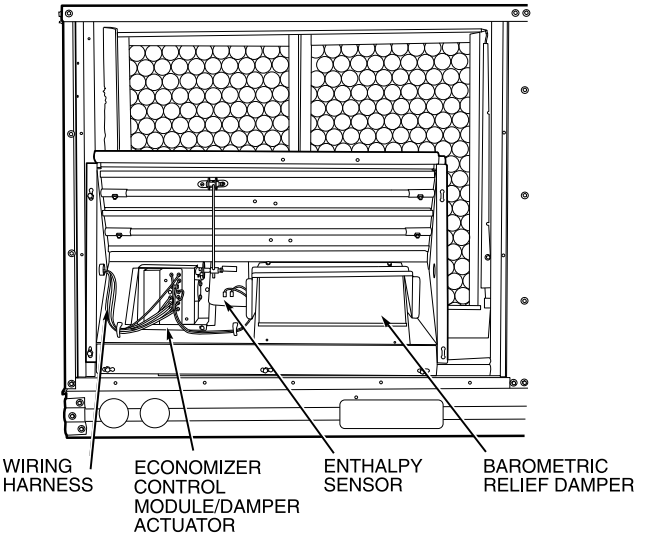
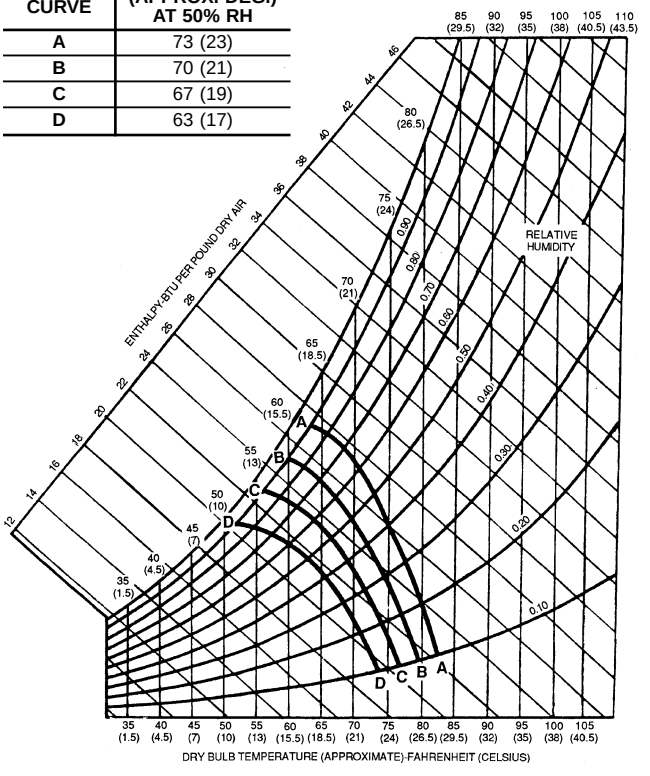


Fig. 26 — PARABLADE Economizer Installed in Unit

6. Determine the enthalpy changeover set point from Fig. 27. The enthalpy changeover set point should be set to return the outdoor-air damper to the minimum position when enthalpy rises above the set point. The settings are A, B, C, and D. Set the enthalpy changeover per the setting in Fig. 27.
7. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged. See Fig. 28.
8. Fasten hood top and side plate assembly (Fig. 29) to outdoor-air opening panel with screws provided.
9. Slide outdoor-air inlet screen into screen track on hood side plate. While holding screen in place, fasten screen retainer to hood using screws provided. See Fig. 30.

NOTE: Refer to Fig. 31 for PARABLADE economizer barometric relief damper characteristics.

CONTROL CURVE	CONTROL POINT (APPROX. DEG.) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)



RH — Relative Humidity

Fig. 27 — Enthalpy Settings for PARABLADE Economizer

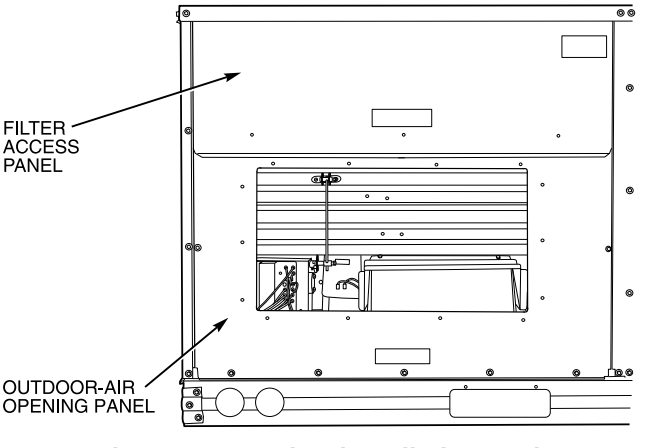


Fig. 28 — Panel Reinstalled on Unit

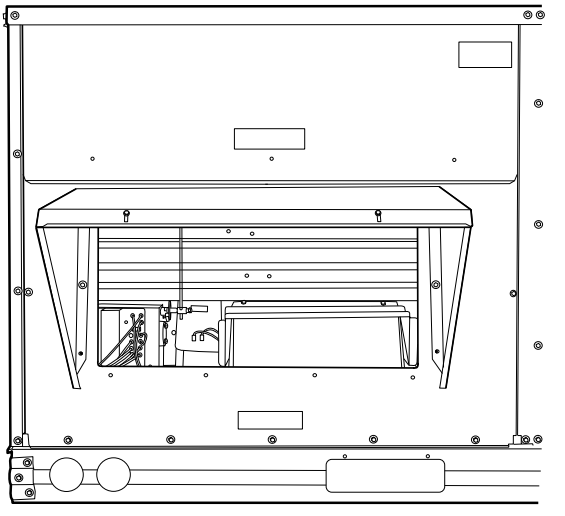


Fig. 29 — Outdoor-Air Hood Installed on Unit

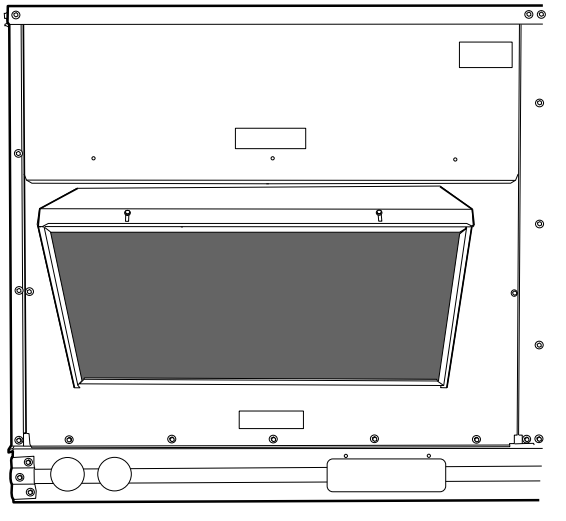


Fig. 30 — Filter Installed on Outdoor-Air Hood

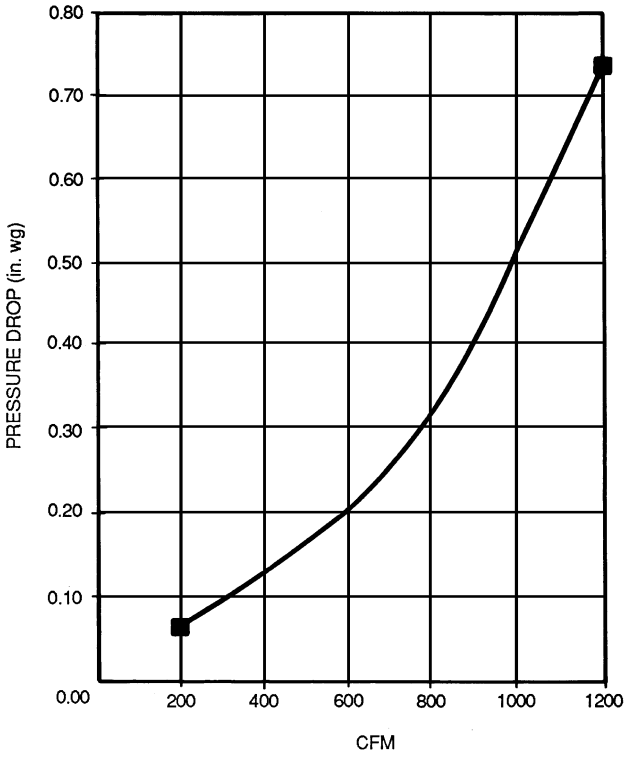


Fig. 31 — PARABLADE Economizer Barometric Relief Damper Characteristics

Step 9 — Adjust Evaporator-Fan Speed — Adjust evaporator-fan speed to meet jobsite conditions. Table 3 shows fan rpm at motor pulley settings. Table 4 shows motor performance. Refer to Tables 5-18 to determine fan speed settings.

DIRECT DRIVE MOTORS — The evaporator-fan motor factory speed setting is shown on label diagram affixed to base unit. If other than factory setting is desired, refer to label diagram for motor reconnection. See Fig. 32 for direct drive motor location.

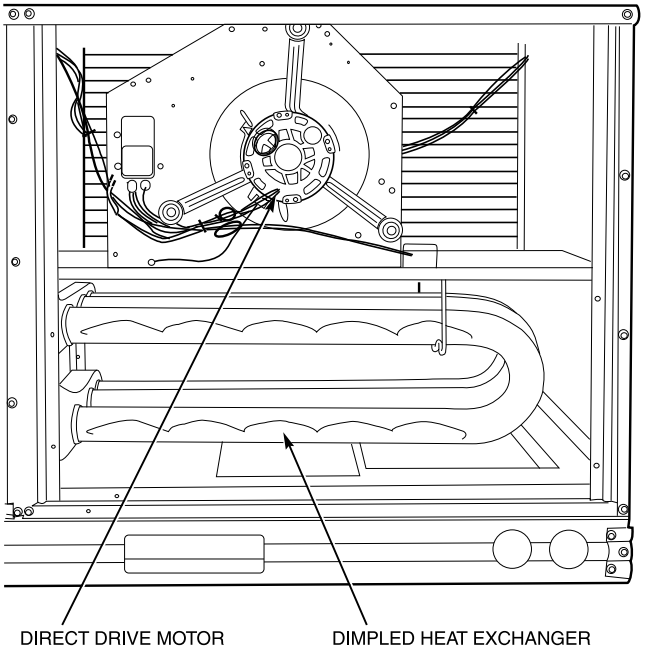


Fig. 32 — Direct Drive Motor Mounting

BELT DRIVE MOTORS — Fan motor pulleys are factory set for speed shown in Table 1. See Fig. 33 for belt drive motor location.

NOTE: Before adjusting fan speed, make sure the new fan speed will provide an air temperature rise range as shown in Table 1.

To change fan speed:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 33.
3. Loosen movable pulley flange setscrew (see Fig. 34).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)

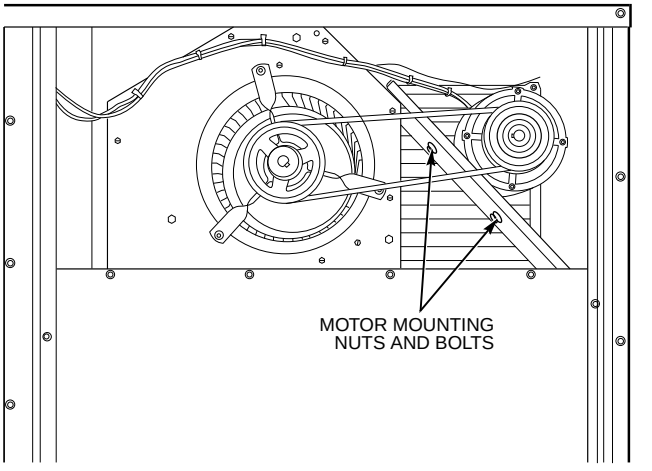


Fig. 33 — Belt Drive Motor Mounting

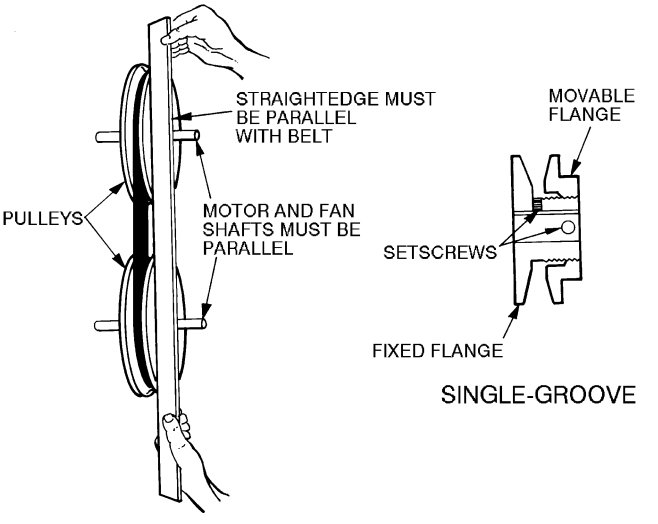


Fig. 34 — Evaporator-Fan Pulley Adjustment

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting.

To adjust belt tension:

1. Loosen fan motor mounting nuts.
2. Slide motor mounting plate away from fan scroll for proper belt tension (½-in. deflection with one finger).
3. Tighten motor mounting nuts.
4. Adjust bolt and tighten nut to secure motor in fixed position.

Table 3 — Fan Rpm at Motor Pulley Settings*

UNIT 48TJ	MOTOR PULLEY TURNS OPEN										
	0	½	1	1½	2	2½	3	3½	4	4½	5
004†	1090	1055	1025	990	960	925	890	860	825	795	760
005†	1185	1150	1115	1080	1045	1015	980	945	910	875	840
006†	1300	1260	1220	1180	1140	1100	1060	1020	980	940	900
007**	1460	1420	1380	1345	1305	1265	1225	1185	1150	1110	1070

*Approximate fan rpm shown.
†Indicates alternate motor and drive package.
**Indicates standard motor and drive package.

Table 4 — Motor Data

UNIT 48TJ	EVAPORATOR-FAN MOTOR	MAXIMUM CONTINUOUS BHP*	MAXIMUM OPERATING WATTS*	UNIT VOLTAGE	MAXIMUM AMP DRAW
004	Std	.34	440	208/230	2.9
				460	1.4
				575	1.4
	Alt	1.00	1000	208/230	5.1
				460	2.3
				575	2.3
005	Std	.75	850	208/230	3.7
				460	1.9
				575	1.9
	Alt	1.00	1000	208/230	5.1
				460	2.3
				575	2.3
006	Std	1.20	1340	208/230	6.2
				570	3.4
				575	3.4
	Alt	1.80	1921	208/230†	9.2
				208/230**	6.1
				460	4.7
				575	4.7
007	Std	2.40	2120	208/230	6.1
				460	2.7
				575	2.7

LEGEND

Bhp — Brake Horsepower

*Extensive motor and electrical testing on these units ensures that the full horsepower and watts range of the motors can be utilized with confidence. Using your fan motors up to the ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
†Single-phase motor.
**3-phase motor.

Table 5 — Fan Performance, 48TJE/TJF004 Vertical Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts
900	0.49	253	0.50	277	0.51	307	0.55	363
1000	0.42	270	0.43	292	0.43	321	0.51	374
1100	0.37	287	0.38	307	0.39	335	0.46	385
1200	0.33	304	0.33	323	0.34	349	0.40	397
1300	0.27	321	0.28	338	0.28	364	0.34	408
1400	0.20	338	0.23	354	0.25	378	0.29	420
1500	0.16	355	0.18	369	0.20	392	0.23	431

LEGEND

Esp — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. To convert watts to bhp:

$$bhp = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .63

Table 6 — Fan Performance, 48TJE/TJF004 Vertical Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)															
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	**581**	**119**	**673**	**179**	**736**	**219**	805	249	865	288	911	338	957	388	988	428
1000	**644**	**189**	**709**	**219**	782	279	835	298	900	348	937	378	992	438	1039	487
1100	**687**	**219**	**746**	**259**	806	298	867	348	929	398	964	398	1013	487	1068	547
1200	**733**	**259**	785	318	843	348	903	408	960	467	994	497	1045	557	1090	637
1300	**754**	**288**	826	378	891	428	942	477	991	527	1047	597	1075	637	**1122**	**696**
1400	810	348	868	448	937	507	984	567	1032	617	1067	666	**1110**	**726**	**1160**	**766**
1500	841	418	911	527	985	607	1029	656	1073	716	**1109**	**766**	**1150**	**816**	**1190**	**855**

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)							
	0.9		1.0		1.1		1.2	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	1039	448	1061	487	1083	527	**1105**	**567**
1000	1061	507	1086	547	**1111**	**587**	**1136**	**627**
1100	1090	577	**1109**	**607**	**1127**	**637**	**1145**	**666**
1200	**1109**	**647**	**1156**	**676**	**1203**	**706**	**1250**	**736**
1300	**1152**	**716**	**1190**	**756**	**1228**	**796**	**1266**	**836**
1400	**1181**	**806**	**1237**	**845**	**1293**	**885**	**1349**	**925**
1500	**1225**	**895**	**1271**	**945**	**1317**	**995**	1363	1044

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. ▭ indicates field-supplied motor and drive are required.
3. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Alternate motor drive range: 760 to 1090. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$bhp = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .75

Table 7 — Fan Performance, 48TJD/TJE/TJF005 Vertical Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts
1200	0.68	458	0.74	506	0.74	572	0.85	632
1300	0.61	471	0.67	521	0.66	589	0.78	651
1400	0.53	503	0.59	556	0.59	616	0.70	681
1500	0.45	536	0.51	593	0.52	631	0.63	698
1600	0.36	557	0.42	616	0.45	654	0.56	723
1700	0.26	584	0.32	646	0.37	678	0.48	750
1800	0.15	610	0.22	674	0.30	698	0.41	772
1900	0.04	629	0.11	696	0.23	720	0.34	796
2000	—	—	—	—	0.16	744	0.26	823

LEGEND

Esp — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .66

Table 8 — Fan Performance, 48TJD/TJE/TJF005 Vertical Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)															
	0.1		0.2		0.3		0.4		0.6		0.7		0.8		0.9	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1200	**596**	**210**	**665**	**263**	**722**	**320**	**779**	**378**	872	504	915	567	957	630	993	678
1300	**633**	**252**	**699**	**315**	**754**	**378**	**809**	**441**	902	578	943	641	984	704	1021	772
1400	**672**	**315**	**735**	**378**	**788**	**441**	840	504	933	651	972	720	1011	788	1049	837
1500	**711**	**368**	**770**	**441**	**822**	**510**	873	578	963	725	1002	804	1041	858	1077	922
1600	**751**	**441**	840	515	871	588	907	662	993	787	1033	869	1072	950	1107	998
1700	**791**	**515**	873	599	907	678	941	757	1024	889	1064	976	1103	1063	1137	1128
1800	**831**	**609**	881	693	929	772	976	851	1057	991	1095	1078	1132	1165	1167	1239
1900	872	704	919	788	965	877	1011	967	1091	1104	1127	1191	1162	1277	1197	1360
2000	913	809	958	904	1002	993	1046	1082	1125	1237	1160	1323	1195	1410	1229	1491

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	1.0		1.1		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1200	1028	725	1056	751	1083	778	1134	935	1185	935	**1231**	**869**
1300	1058	841	1090	888	1121	935	1171	988	1219	1001	1268	1029
1400	1086	885	1120	950	1153	976	1210	1071	1257	1105	1307	1190
1500	1113	985	1147	1054	1180	1081	1241	1215	1295	1294	1339	1350
1600	1141	1084	1174	1134	1207	1196	1269	1339	1326	1454	1376	1558
1700	1171	1194	1203	1278	1235	1310	1296	1463	1354	1605	1407	1738
1800	1202	1313	1233	1398	1263	1425	1323	1597	1381	1747	1436	1907
1900	1232	1442	1263	1532	1294	1559	1351	1731	1408	1889	1463	2068
2000	1262	1572	1294	1671	1325	1702	1382	1884	1436	2040	1489	2229

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. ▭ indicates field-supplied motor and drive are required.
3. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Alternate motor drive range: 840 to 1185. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .75

Table 9 — Fan Performance, 48TJD/TJE/TJF006 Vertical Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				MEDIUM SPEED				HIGH SPEED			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts
1500	0.69	750	1.01	791	1.00	782	1.20	845	1.22	875	1.28	949
1600	0.49	780	0.85	824	0.85	821	1.06	883	1.09	913	1.17	988
1700	0.29	810	0.70	857	0.70	861	0.93	921	0.97	950	1.06	1027
1800	0.09	839	0.54	891	0.55	900	0.80	959	0.84	988	0.95	1066
1900	—	—	0.39	924	0.40	940	0.67	997	0.72	1025	0.84	1105
2000	—	—	0.23	957	0.25	979	0.54	1035	0.59	1063	0.73	1144
2100	—	—	0.08	990	0.10	1018	0.41	1073	0.46	1101	0.62	1183
2200	—	—	—	—	—	—	0.28	1111	0.34	1138	0.51	1222
2300	—	—	—	—	—	—	0.15	1149	0.21	1176	0.40	1261
2400	—	—	—	—	—	—	0.02	1187	0.09	1213	0.29	1300
2500	—	—	—	—	—	—	—	—	—	—	0.18	1340

LEGEND

Esp — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. To convert watts to bhp:

$$bhp = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .67

Table 10 — Fan Performance, 48TJD/TJE/TJF006 Vertical Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1500	**729**	**368**	**788**	**429**	**896**	**572**	981	705	1070	869	1144	1032	1226	1216	**1301**	**1492**	**1380**	**1757**
1600	**770**	**429**	**826**	**501**	930	654	1015	797	1098	961	1173	1134	1242	1308	**1318**	**1523**	**1392**	**1800**
1700	**811**	**511**	**864**	**582**	964	736	1051	899	1124	1053	1203	1237	1270	1420	**1335**	**1615**	**1408**	**1850**
1800	**852**	**593**	903	674	999	838	1085	1001	1155	1155	1231	1349	1300	1553	**1361**	**1747**	1423	1952
1900	**893**	**695**	942	777	1035	940	1119	1124	1191	1288	1256	1461	**1329**	**1676**	**1391**	**1891**	1448	2095
2000	935	797	982	889	1070	1063	1153	1247	1227	1431	1287	1604	**1355**	**1809**	1420	2034	1477	2258
2100	977	910	1022	1012	1107	1196	1187	1380	1260	1574	**1323**	**1758**	1381	1952	1449	2187	1509	2420
2200	1019	1042	1063	1145	1144	1328	1222	1523	1294	1737	1359	1931	1413	2126	1474	2350	1538	2578
2300	1061	1185	1104	1288	1182	1502	1258	1686	**1328**	**1901**	1393	2115	1449	2310	1502	2518	1561	2732
2400	1103	1328	1145	1441	1220	1645	1293	1860	1362	2074	1426	2310	1485	2524	1540	2720	1590	2900
2500	1145	1492	1186	1604	1259	1819	1329	2044	1397	2269	1460	2504	1522	2739	1581	2948	1629	3113

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. [ ] indicates field-supplied motor and drive are required.
3. Maximum usable watts input is 1921. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Alternate motor drive range: 900 to 1300. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$bhp = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .74

Table 11 — Fan Performance, 48TJD/TJE/TJF007 Vertical Discharge Units; Standard Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	0.1		0.2		0.4		0.6		0.8		1.0	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1800	**942**	**700**	**978**	**646**	**1063**	**771**	1147	891	1248	1081	1322	1190
1900	**982**	**779**	**1023**	**739**	1097	843	1175	1006	1266	1156	1356	1310
2000	**1022**	**867**	**1068**	**835**	1132	924	1218	1106	1303	1258	1397	1353
2100	**1063**	**998**	1115	916	1180	1056	1261	1207	1340	1361	1428	1473
2200	1104	1081	1159	1039	1214	1148	1310	1353	1375	1447	1459	1595
2300	1130	1140	1202	1156	1248	1233	1358	1499	1410	1526	**1488**	**1709**
2400	1174	1224	1237	1258	1292	1378	1392	1604	1460	1683	**1532**	**1892**
2500	1201	1335	1272	1361	1335	1517	1427	1718	**1518**	**1910**	**1575**	**2076**
2600	1246	1482	1320	1491	1368	1604	1458	1823	1562	2136	1620	2283
2700	1285	1595	1361	1613	1400	1691	**1490**	**1936**	1602	2326	1666	2504
2800	1304	1639	1402	1726	1439	1840	1543	2145	1642	2512	—	—
2900	1345	1814	1446	1910	**1477**	**1989**	1585	2335	—	—	—	—
3000	1378	2032	**1489**	**2084**	1529	2223	1598	2444	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)							
	1.2		1.4		1.6		1.8	
	Rmp	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1800	1395	1301	**1475**	**1387**	**1542**	**1517**	**1609**	**1648**
1900	1430	1404	**1504**	**1499**	**1556**	**1613**	**1655**	**1840**
2000	1459	1482	**1532**	**1613**	**1588**	**1744**	**1675**	**1919**
2100	**1489**	**1595**	**1567**	**1761**	**1626**	**1910**	**1684**	**2067**
2200	**1528**	**1726**	**1603**	**1919**	**1666**	**2093**	1711	2241
2300	**1561**	**1884**	**1637**	**2076**	1710	2272	1760	2442
2400	**1584**	**2015**	1671	2249	1756	2467	1825	2664
2500	1633	2232	1698	2405	—	—	—	—
2600	1675	2436	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—
2800	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. ▭ indicates field-supplied motor and drive are required.
3. Maximum usable watts input is 2120. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Standard motor drive range: 1070 to 1460. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .84

Table 12 — Fan Performance, 48TJE/TJF004 Horizontal Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts
900	0.54	253	0.57	277	0.55	307	0.60	363
1000	0.49	270	0.51	292	0.52	321	0.53	374
1100	0.43	287	0.45	307	0.46	335	0.49	385
1200	0.39	304	0.40	323	0.38	349	0.43	397
1300	0.33	321	0.35	338	0.35	364	0.36	408
1400	0.26	338	0.28	354	0.29	378	0.32	420
1500	0.21	355	0.23	369	0.24	392	0.25	431

LEGEND

Esp — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .63

Table 13 — Fan Performance, 48TJE/TJF004 Horizontal Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)															
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	**526**	**70**	**584**	**99**	**656**	**139**	**734**	**219**	818	269	875	269	924	308	953	348
1000	**570**	**109**	**627**	**149**	**738**	**189**	800	259	848	288	895	308	936	348	977	388
1100	**614**	**149**	**670**	**189**	**758**	**229**	812	288	863	308	914	348	960	388	1005	428
1200	**658**	**189**	**710**	**229**	780	279	840	318	889	358	938	398	988	448	1038	497
1300	**703**	**239**	**752**	**269**	808	318	868	368	916	408	963	448	1012	507	1061	557
1400	**725**	**288**	776	308	845	378	891	418	937	467	983	507	1027	557	1071	597
1500	**755**	**328**	816	378	870	428	924	477	969	527	1014	577	1056	627	**1097**	**676**

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)							
	0.9		1.0		1.1		1.2	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	989	388	1028	438	1074	487	**1120**	**537**
1000	1020	438	1064	477	**1124**	**537**	**1185**	**597**
1100	1052	487	**1100**	**527**	**1163**	**587**	**1225**	**647**
1200	1076	527	**1136**	**577**	**1201**	**647**	**1266**	**716**
1300	1090	607	**1172**	**647**	**1239**	**716**	**1306**	**786**
1400	**1108**	**666**	**1208**	**706**	**1278**	**786**	**1347**	**865**
1500	**1117**	**696**	**1245**	**776**	**1315**	**865**	**1385**	**955**

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 4.)
2. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Values include losses for filters, unit casing, and wet coils.
4. Alternate motor drive range: 760 to 1090. All other rpms require field-supplied drive.
5. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .75

Table 14 — Fan Performance, 48TJD/TJE/TJF005 Horizontal Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts
1200	0.75	458	0.81	506	0.87	572	0.92	632
1300	0.68	471	0.74	521	0.79	589	0.85	651
1400	0.60	503	0.66	556	0.71	616	0.77	681
1500	0.51	536	0.58	593	0.64	631	0.70	698
1600	0.42	557	0.49	616	0.56	654	0.63	723
1700	0.32	584	0.39	646	0.48	678	0.55	750
1800	0.21	610	0.29	674	0.41	698	0.48	772
1900	0.09	629	0.18	696	0.33	720	0.41	796
2000	—	—	0.06	731	0.26	744	0.33	823

LEGEND

Esp — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .66

Table 15 — Fan Performance, 48TJD/TJE/TJF005 Horizontal Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.3		0.4		0.6		0.7		0.8		0.9		1.0	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1300	**569**	**189**	**641**	**242**	**701**	**299**	**761**	**357**	859	483	901	546	943	609	987	652	1030	695
1400	**604**	**231**	**673**	**294**	**731**	**352**	**788**	**410**	887	546	928	615	968	683	1006	709	1044	736
1500	**640**	**284**	**705**	**347**	**761**	**410**	**817**	**473**	914	620	955	688	996	757	1033	797	1069	838
1600	**676**	**336**	**738**	**399**	**793**	**468**	847	536	940	683	982	767	1024	851	1060	891	1095	930
1700	**713**	**399**	**772**	**462**	**825**	**536**	877	609	967	767	1009	851	1051	935	1087	998	1123	1073
1800	**750**	**473**	**806**	**536**	857	615	908	693	997	851	1037	940	1077	1030	1114	1108	1151	1185
1900	**788**	**546**	841	620	890	704	939	788	1026	956	1065	1040	1104	1124	1141	1221	1178	1318
2000	**826**	**630**	876	714	924	799	971	883	1056	1061	1094	1151	1132	1240	1168	1371	1204	1502
2100	864	735	912	809	958	898	1004	988	1087	1177	1125	1271	1162	1366	1197	1485	1231	1604

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.1		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1300	1068	792	1106	889	1134	998	1189	1138	1245	1358
1400	1086	833	1128	930	1183	1052	1226	1215	1297	1406
1500	1104	925	1139	1012	1218	1090	1286	1282	1320	1463
1600	1129	1022	1162	1114	1228	1186	1303	1339	1343	1530
1700	1156	1150	1188	1226	1250	1291	1319	1444	1382	1607
1800	1183	1262	1215	1339	1276	1415	1334	1569	1398	1722
1900	1211	1390	1243	1461	1303	1540	1359	1702	1418	1865
2000	1238	1548	1271	1594	1330	1664	1386	1846	1439	2018
2100	1265	1666	1298	1727	1358	1808	1413	1989	1466	2171

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. ▭ indicates field-supplied motor and drive are required.
3. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Alternate motor drive range: 840 to 1185. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .75

Table 16 — Fan Performance, 48TJD/TJE/TJF006 Horizontal Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				MEDIUM SPEED				HIGH SPEED			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts	Esp	Watts
1500	0.74	750	1.06	791	1.07	782	1.27	845	1.26	875	1.33	949
1600	0.54	780	0.90	824	0.92	821	1.13	883	1.14	913	1.22	988
1700	0.34	810	0.75	857	0.77	861	1.00	921	1.01	950	1.11	1027
1800	0.14	839	0.59	891	0.62	900	0.87	959	0.89	988	1.00	1066
1900	—	—	0.44	924	0.47	940	0.74	997	0.77	1025	0.89	1105
2000	—	—	0.28	957	0.32	979	0.61	1035	0.64	1063	0.78	1144
2100	—	—	0.13	990	0.17	1018	0.48	1073	0.51	1101	0.67	1183
2200	—	—	—	—	0.02	1058	0.35	1111	0.39	1138	0.56	1222
2300	—	—	—	—	—	—	0.22	1149	0.26	1176	0.45	1261
2400	—	—	—	—	—	—	0.09	1187	0.14	1213	0.34	1300
2500	—	—	—	—	—	—	—	—	—	—	0.23	1340

LEGEND

Esp — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .67

Table 17 — Fan Performance, 48TJD/TJE/TJF006 Horizontal Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	0.1		0.2		0.4		0.6		0.8		1.0	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1500	**730**	**357**	**789**	**420**	**896**	**557**	990	704	1072	872	1153	1051
1600	**770**	**420**	**826**	**483**	931	641	1020	788	1101	956	1178	1145
1700	**811**	**494**	**865**	**567**	966	725	1051	883	1133	1061	1205	1240
1800	**852**	**578**	905	651	1002	820	1084	977	1163	1156	1235	1355
1900	**894**	**567**	945	757	1037	925	1119	1093	1194	1271	1266	1471
2000	936	778	984	862	1072	1030	1154	1219	1226	1397	1297	1608
2100	978	893	1024	977	1108	1156	1192	1355	1259	1545	**1327**	**1744**
2200	1021	1019	1064	1103	1145	1282	1225	1503	1294	1702	**1359**	**1902**
2300	1064	1156	1104	1240	1183	1429	1260	1650	**1330**	**1870**	1392	2070
2400	1107	1303	1145	1387	1222	1524	1296	1818	1365	2038	1426	2259
2500	1150	1460	1186	1555	1262	1765	1331	1986	1400	2227	1461	2459

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)							
	1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1500	1221	1229	1256	1366	1283	1387	**1303**	**1282**
1600	1252	1334	**1311**	**1524**	**1340**	**1660**	**1330**	**1692**
1700	1278	1439	**1345**	**1650**	**1397**	**1849**	1424	1986
1800	**1303**	**1555**	**1371**	**1776**	1433	1996	1480	2196
1900	**1330**	**1671**	**1396**	**1902**	1460	2133	1517	2364
2000	**1362**	**1818**	1422	2038	1485	2270	1544	2522
2100	1393	1965	1452	2185	1510	2427	1570	2674
2200	1423	2122	1483	2354	1538	2585	1594	2821
2300	1454	2291	1515	2532	1571	2758	1623	2976
2400	1485	2480	1544	2721	1604	2947	1657	3152
2500	1518	2679	1574	2905	1633	3134	1692	3345

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. Shaded cells indicate field-supplied motor and drive are required.
3. Maximum usable watts input is 1921. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Alternate motor drive range: 900 to 1300. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .74

Table 18 — Fan Performance, 48TJD/TJE/TJF007 Horizontal Discharge Units; Standard Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1800	**885**	**623**	**942**	**700**	**1047**	**835**	1139	956	1193	1031	1276	1165	1341	1250	1413	1378	**1474**	**1404**
1900	**928**	**700**	**982**	**779**	1084	932	1160	1006	1223	1114	1301	1233	1374	1361	1437	1439	**1490**	**1482**
2000	**971**	**787**	**1022**	**867**	1121	1014	1188	1097	1254	1216	1329	1284	1396	1473	1460	1491	**1509**	**1569**
2100	**1015**	**891**	**1063**	**998**	1140	1064	1196	1140	1272	1292	1354	1404	1413	1552	**1475**	**1534**	**1529**	**1700**
2200	**1060**	**998**	1104	1081	1159	1106	1229	1258	1306	1361	1363	1508	1434	1604	**1487**	**1639**	**1554**	**1831**
2300	1104	1123	1130	1140	1196	1224	1264	1387	1340	1473	1397	1648	1459	1665	**1520**	**1831**	**1576**	**1980**
2400	1138	1165	1174	1224	1245	1396	1305	1447	1373	1630	1440	1726	**1502**	**1823**	**1552**	**1980**	1604	2136
2500	1183	1275	1201	1335	1284	1465	1338	1552	1402	1761	**1469**	**1805**	**1524**	**1980**	1585	2136	1638	2292
2600	1210	1404	1246	1482	1312	1560	1366	1735	1435	1858	**1494**	**1936**	**1552**	**2119**	1616	2317	1671	2462
2700	1254	1560	1285	1595	1354	1726	1403	1892	**1474**	**1954**	1536	2171	1584	2300	1646	2487	1706	2653
2800	1274	1613	1304	1639	1374	1875	1459	1989	1514	2136	1570	2343	1624	2504	1677	2661	—	—
2900	1318	1726	1345	1814	1412	2050	1496	2240	1529	2300	1603	2521	1671	2725	—	—	—	—
3000	1362	1945	1378	2032	1451	2119	1534	2343	1560	2470	1611	2648	1690	2886	—	—	—	—

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. Shaded cells indicate field-supplied motor and drive are required.
3. Maximum usable watts input is 2120. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Standard motor drive range: 1070 to 1460. All other rpms require field-supplied drive.
7. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .84

START-UP

Unit Preparation — Make sure that unit has been installed in accordance with these installation instructions and applicable codes.

Return-Air Filters — Make sure correct filters are installed in filter tracks. See Table 1. Do not operate unit without return-air filters.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

Internal Wiring — Check all electrical connections in unit control boxes. Tighten as required.

Refrigerant Service Ports — To service refrigerant service ports, remove refrigerant service port access panel. See Fig. 35. Each unit system has 4 Schrader-type service gage ports: one on the suction line, one on the liquid line, and two on the compressor discharge line. Be sure that caps on the ports are tight. When a controls upgrade package is used, one Schrader-type valve is located under both the high-pressure switch and the low-pressure switch.

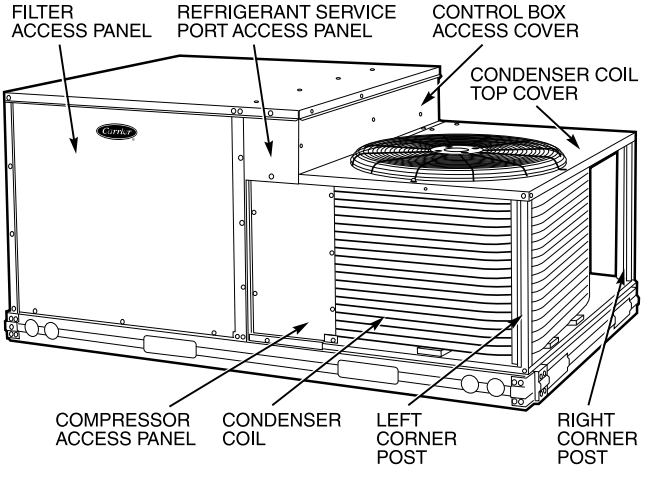


Fig. 35 — Cleaning Condenser Coil

Cooling — Set space thermostat to OFF position. To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO. position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Service, Refrigerant Charge section, page 30.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after 30-second delay.

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting.

Main Burners — Main burners are factory set and should require no adjustment.

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. After ensuring that the unit continues to heat the building, lower the thermostat setting below room temperature and verify that the burners and evaporator fan turn off. (Fan will turn off only if fan selector switch is in the AUTO. position.)

Refer to Table 19 for the correct orifice to use at high altitudes.

Table 19 — Altitude Compensation*

ELEVATION (ft)	74,000 AND 115,000 BTUH NOMINAL INPUT		150,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	33	45	30	38
2,000	34	46	30	39
3,000	35	47	31	40
4,000	36	47	32	41
5,000	36	47	33	42
6,000	37	48	34	43
7,000	37	48	35	43
8,000	38	49	36	44
9,000	39	49	37	44
10,000	41	50	38	45
11,000	43	50	39	45
12,000	44	51	40	46
13,000	44	51	41	47
14,000	45	52	42	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes.
†Orifices available through your Carrier distributor.

Heating

1. Purge gas supply line of air by opening union ahead of gas valve. If gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
4. The induced draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burner does not light, then there is a 22-second delay before another 5-second try. If the burner still does not light, the time delay is repeated. If the burner does not light within 15 minutes, there is a lockout. To reset the control, break the 24-v power to W1.
6. The evaporator-fan motor will turn on 45 seconds after the burners are ignited.
7. The evaporator-fan motor will turn off 45 seconds after thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate.

NOTE: The default value for the evaporator-fan motor ON/OFF delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the ON delay can be reduced to 0 seconds and the OFF delay can be extended to 180 seconds. When one flash of the LED is observed, the evaporator-fan ON/OFF delay has been modified.

If the limit switch trips at the start of the heating cycle during the evaporator ON delay, the time period of the ON delay for the next cycle will be 5 seconds less than the time at which the switch tripped. (Example: If the limit switch trips at 30 seconds, the evaporator-fan ON delay for the next cycle will occur at 25 seconds.) To prevent short-cycling, a 5-second reduction will only occur if a minimum of 10 minutes has elapsed since the last call for heating.

The evaporator-fan OFF delay can also be modified. Once the call for heating has ended, there is a 10-minute period during which the modification can occur. If the limit switch trips during this period, the evaporator-fan OFF delay will increase by 15 seconds. A maximum of 9 trips can occur, extending the evaporator-fan OFF delay to 180 seconds.

To restore the original default value, reset the power to the unit.

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting heating selector lever below room temperature will temporarily shut unit off until space temperature falls below thermostat setting.

Safety Relief — A soft solder joint at the suction service Schrader port provides pressure relief under abnormal temperature and pressure conditions (i.e., fire in building).

Ventilation (Continuous Fan) — Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation. When the evaporator-fan selector switch is turned to the OFF position, there is a 30-second delay before the fan turns off.

Operating Sequence

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 are energized, and the indoor (evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. When the thermostat is satisfied, compressor contactor (C) is deenergized and the compressor and OFM shut off. After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. To prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay.

COOLING, UNITS WITH VARISLIDE™ ECONOMIZER — When the outdoor-air temperature is above the outdoor-air thermostat (OAT) setting and the room thermostat calls for cooling, compressor contactor is energized to start compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the thermostat is satisfied, there is a 30-second delay before the evaporator fan turns off. The damper then moves to the fully closed position. When using continuous fan, the damper moves to the minimum position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for cooling, the economizer damper moves to the minimum position. If the supply-air temperature is above 57 F, the damper continue to open until it reaches the fully open position or until the supply-air temperature drops below 52 F.

When the supply-air temperature falls between 57 F and 52 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 52 F, the damper will modulate closed until it reaches the minimum position or until the supply air temperature is above 52 F. When the thermostat is satisfied, the damper moves to the fully closed position when using AUTO. fan or to the minimum position when using continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing, two stages of cooling. Compressor and the condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature. When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, there is a 30-second delay before the evaporator fan shuts off. The damper then moves to the fully closed position. When using a continuous fan, the damper moves to the minimum position.

COOLING, UNITS WITH PARABLADE ECONOMIZER − When the outdoor-air is above the enthalpy control setting and the room thermostat calls for cooling, the compressor contactor is energized to start the compressor and the outdoor (condenser) fan motor. The indoor (evaporator) fan motor is energized and the economizer damper moves to the minimum position. After the room thermostat is satisfied, the damper will spring return to the fully closed position.

When the outdoor-air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor-air damper is opened proportionally to maintain between 50 and 56 F at the mixed-air sensor. If outside air along cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling. When the room thermostat is satisfied, the damper will spring return to the fully closed position.

HEATING, UNITS WITH ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. To prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. On units equipped for two stages of heat, when additional heat is needed, W2 energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

SERVICE

⚠ CAUTION

When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

Cleaning — Inspect unit interior at the beginning of heating and cooling season and as operating conditions require.

EVAPORATOR COIL

1. Turn unit power off. Remove evaporator coil access panel.
2. If economizer is installed, remove economizer by disconnecting Molex plug and removing economizer mounting screws. Refer to accessory economizer installation instructions or Optional Economizer sections on pages 14 and 16 for more details.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material. Flush condensate pan after completion.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

CONDENSER COIL — Inspect coil monthly. Clean condenser coil annually, and as required by location and outdoor air conditions.

One-Row Coil Cleaning (sizes 004-006) — To access one-row coils, remove screws securing condenser-fan grille to condenser fan top cover. Place grille on top of condenser fan top cover as shown in Fig. 36. It is not necessary to remove the top cover.

Use a water hose or other suitable equipment to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.

Reverse the procedure outlined above to reinstall the condenser-fan grille and condenser fan top cover.

2-Row Coil Cleaning (size 007)

NOTE: Save all screws removed in this section. The screws must be used when reinstalling the equipment.

1. To access 2-row coils, remove screws securing condenser-fan grille to condenser coil top cover. Place grille on top of condenser fan top cover as shown in Fig. 36 and 37. It is not necessary to remove the top cover.
2. Remove 3 screws on right side of compressor access panel. Remove one screw securing condenser coil top cover to compressor access panel. Remove lower screw securing condenser coil to compressor mounting plate.
3. Remove 4 screws securing control box access panel. Remove three screws (located in front of the control box access cover) securing condenser coil top cover.
4. Remove screws securing low-voltage access panel. Remove 2 screws inside low-voltage access panel. Tilt sheet metal (located on left side of low-voltage connections) back 45 degrees.
5. Remove screw securing refrigerant service port access panel.
6. Remove 2 wire ties securing 2-row coils together at hairpin end.
7. Remove screws securing two corner posts. Remove two corner posts.
8. Use right corner post to prop up right side of condenser coil top cover. Slide condenser coil partially out of condenser fan housing. See Fig. 37.

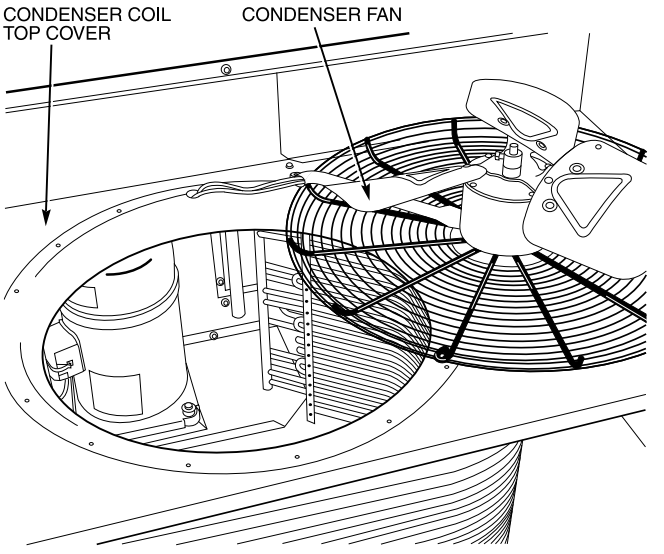


Fig. 36 — Coil Cleaning

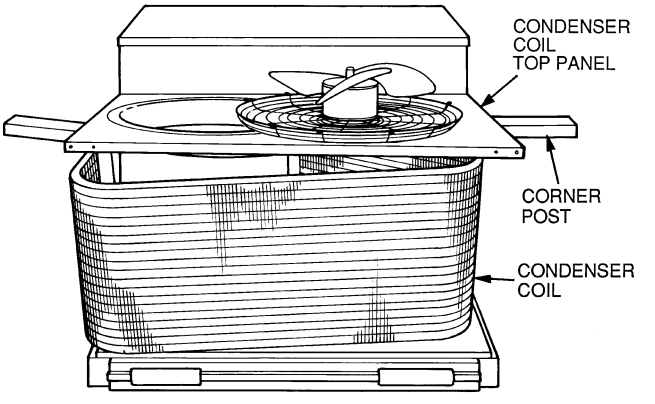


Fig. 37 — Propping Up Condenser Coil Top Cover

9. Use left corner post to prop up left side of condenser coil top cover.
10. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 38.
11. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
12. Secure inner and outer coils together with 2 wire ties.
13. Reposition the outer and inner coil section.
14. Reverse the procedure outlined above to reinstall equipment.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drain dry or protect against freeze-up.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require it. Replacement filters must be same dimensions as original filters.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use disposable filters in place of screens.

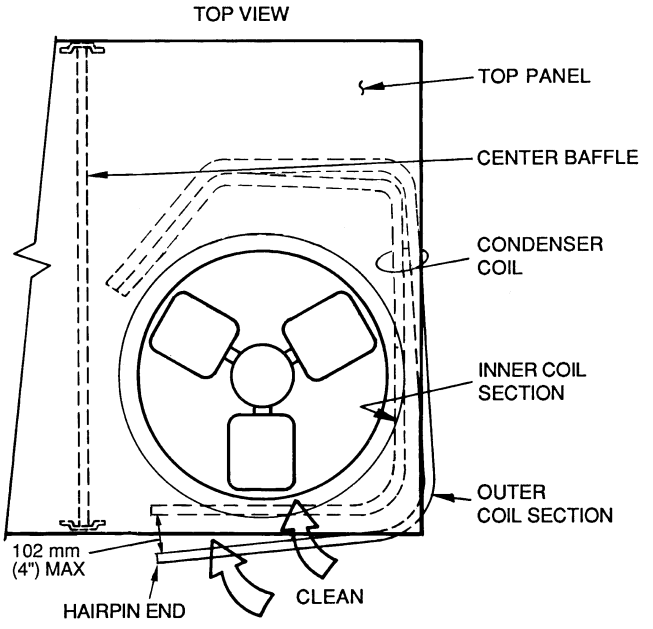


Fig. 38 — Separating Coil Sections

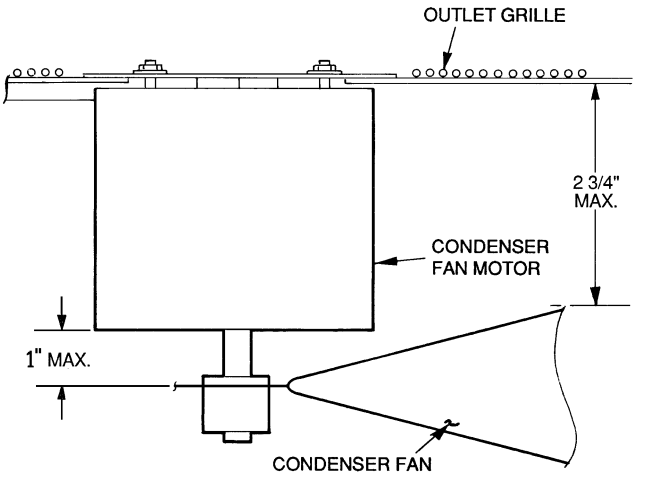


Fig. 39 — Condenser-Fan Adjustment

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory.

FAN MOTOR BEARINGS — Fan motor bearings are of the permanently lubricated type. No further lubrication is required. No lubrication of condenser or evaporator fan motors is required.

Manual Outdoor-Air Damper — If outdoor-air damper blade adjustment is required, see Manual Outdoor-Air Damper section on page 13.

Economizer Adjustment — Refer to Optional Economizer sections on page 14 and 16.

Condenser-Fan Adjustment (Fig. 39) — Shut off unit power supply. Remove condenser-fan assembly (grille, motor, and fan) and loosen fan hub setscrews. Adjust fan height as shown in Fig. 39. Tighten setscrews and replace condenser-fan assembly.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Refer to Carrier GTAC2-5 Charging, Recovery, Recycling, and Reclamation training manual and the following procedures.

Unit panels must be in place when unit is operating during charging procedure.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant. (Refer to Table 1.)

LOW-CHARGE COOLING — Using Cooling Charging Charts, Fig. 40-43, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

TO USE COOLING CHARGING CHART — Take the outdoor ambient temperature and read the suction pressure gage. Refer to chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted.

EXAMPLE: (Fig. 42)

Outdoor Temperature . . . . . 85 F
Suction Pressure . . . . . 80 psig
Suction Temperature should be . . . . . 60 F
(Suction Temperature may vary 5 F.)

If Chargemaster® charging device is used, temperature and pressure readings must be accomplished using the charging chart.

Flue Gas Passageways — To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section on page 32.
2. Remove the flue cover to inspect the heat exchanger.
3. Clean all surfaces as required using a wire brush.

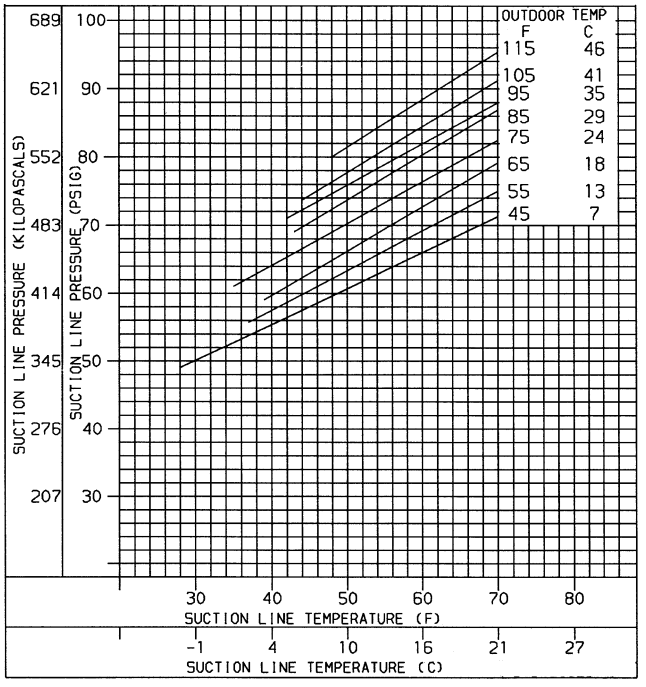


Fig. 40 — Cooling Charging Chart, 48TJ004

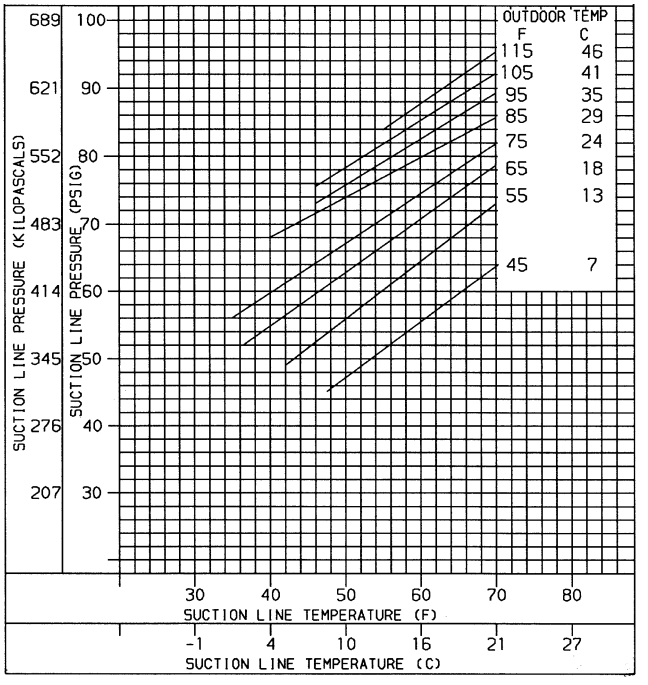


Fig. 42 — Cooling Charging Chart, 48TJ006

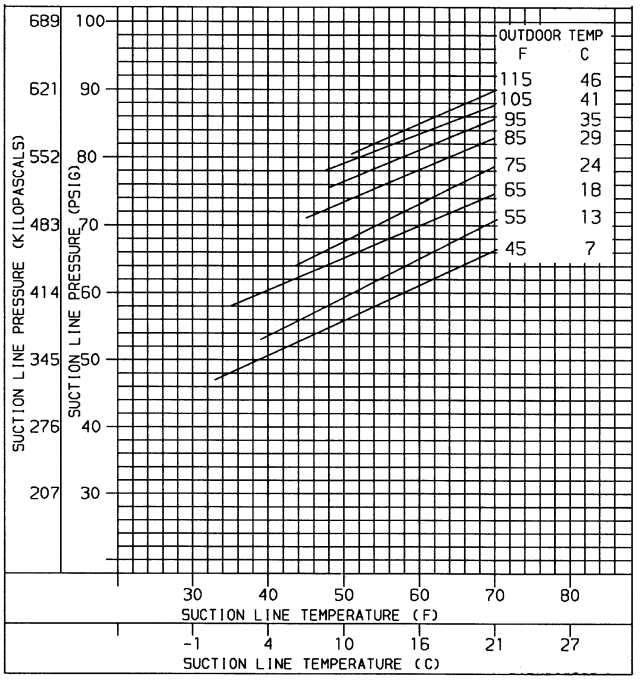


Fig. 41 — Cooling Charging Chart, 48TJ005

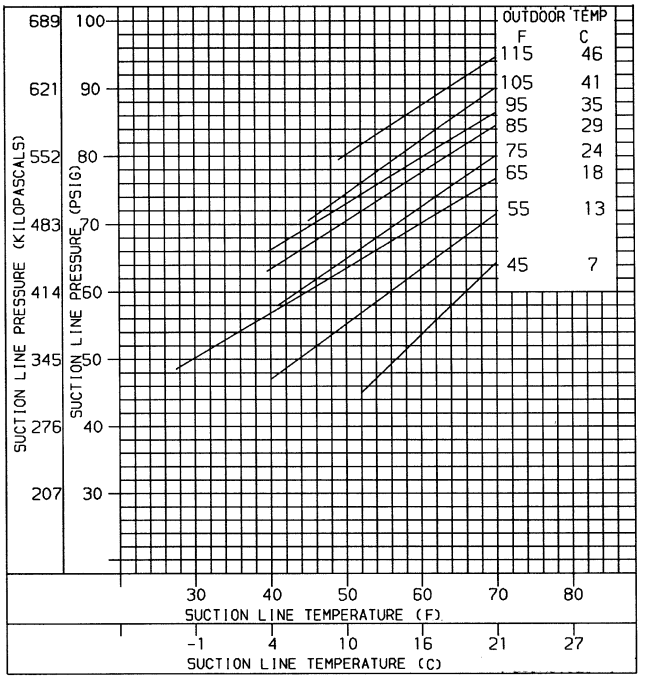


Fig. 43 — Cooling Charging Chart, 48TJ007

Combustion-Air Blower — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

To access burner section, slide the sliding burner partition out of the unit.

To inspect blower wheel, shine a flashlight into drafthood opening. If cleaning is required, remove motor and wheel as follows:

1. Slide burner access panel out.
2. Remove the 7 screws that attach induced-draft motor housing to vestibule plate (Fig. 44).
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. To remove blower from the motor shaft, remove 2 setscrews.
5. To remove motor, remove the 4 screws that hold the motor to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
6. To reinstall, reverse the procedure outlined above.

Limit Switch — Remove blower access panel (Fig. 6). Limit switch is located on the fan deck.

Burner Ignition — Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 10). IGC contains a self-diagnostic LED (light-emitting diode). A single LED on the IGC provides a visual display of operational or sequential problems when the power supply is uninterrupted. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. The LED error code can be observed through the viewport. During servicing refer to the label on the control box cover or Table 20 for an explanation of LED error code descriptions.

If lockout occurs, unit may be reset by interrupting power supply to unit for at least 5 seconds.

Table 20 — LED Error Code Description*

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault

LEGEND

LED — Light-Emitting Diode

*A 3 second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Tables 21-25 for additional information.

Main Burners — To access burners, remove burner access panel and slide out burner partition. See Fig. 9. At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust, if necessary.

⚠ CAUTION

When working on gas train, do not hit or plug orifice spuds.

REMOVAL AND REPLACEMENT OF GAS TRAIN (Fig. 44 - 46.)

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Slide out burner partition. See Fig. 9.
4. Disconnect gas piping at unit gas valve.
5. Remove wires connected to gas valve. Mark each wire.
6. Remove ignitor wires and sensor wires at the Integrated Gas Unit Controller (IGC) (see Fig. 10).
7. Remove the 2 screws that attach the burner rack to the vestibule plate (Fig. 44).
8. Slide the burner tray out of the unit (Fig. 45).
9. To reinstall, reverse the procedure outlined above.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Removal and Replacement of Gas Train section, above.
2. Inspect burners; if dirty, remove burners from rack.
3. Using a soft brush clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 46.
5. Reinstall burners on rack.
6. Reinstall burner rack as described in Removal and Replacement of Gas Train section, above.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

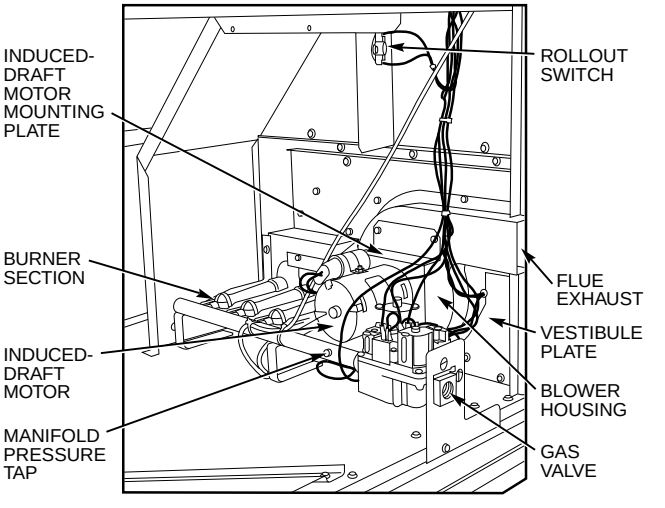


Fig. 44 — Burner Section Details

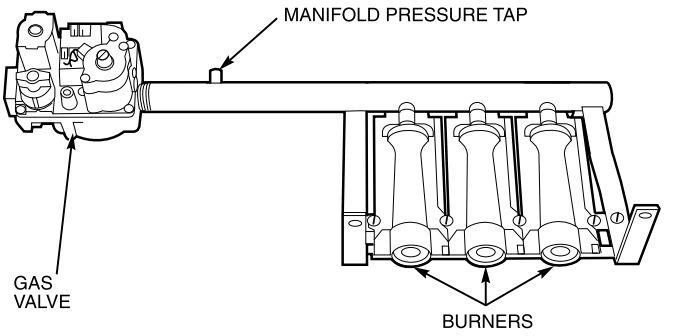
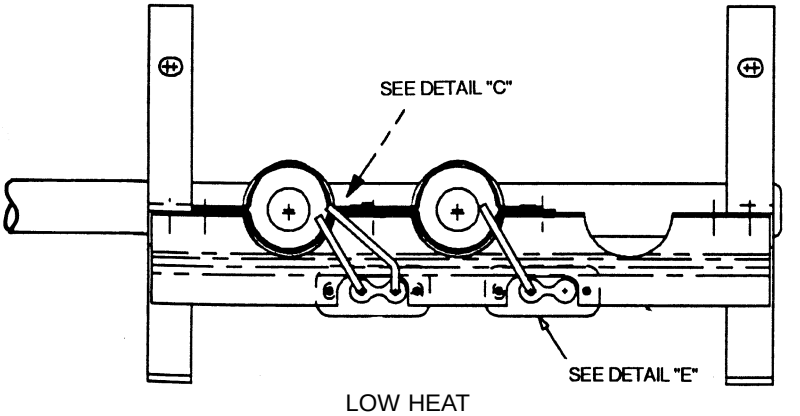
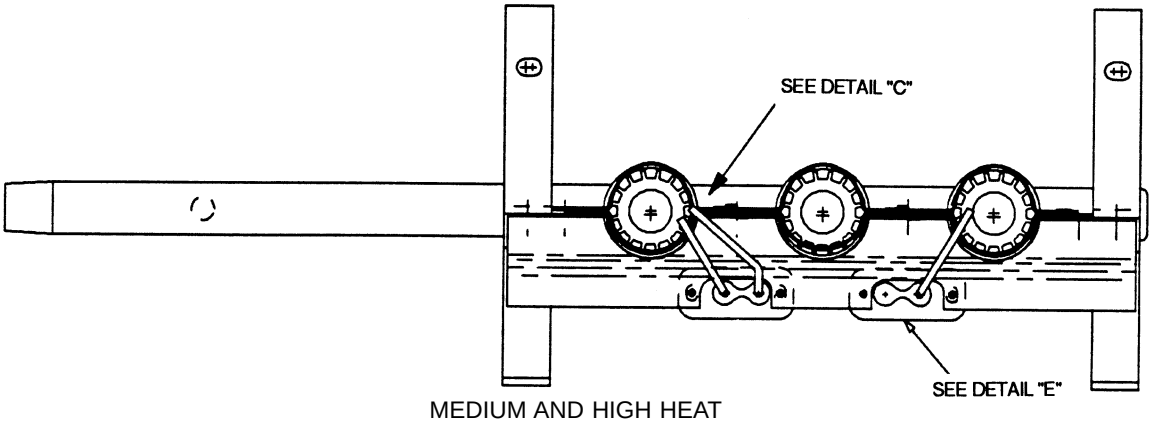


Fig. 45 — Burner Tray Details



LOW HEAT

48TJE004, 48TJD005-007 — 74,000 BTUH INPUT



MEDIUM AND HIGH HEAT

48TJE005-007, 48TJF004 — 115,000 BTUH INPUT

48TJF005-007 — 150,000 BTUH INPUT

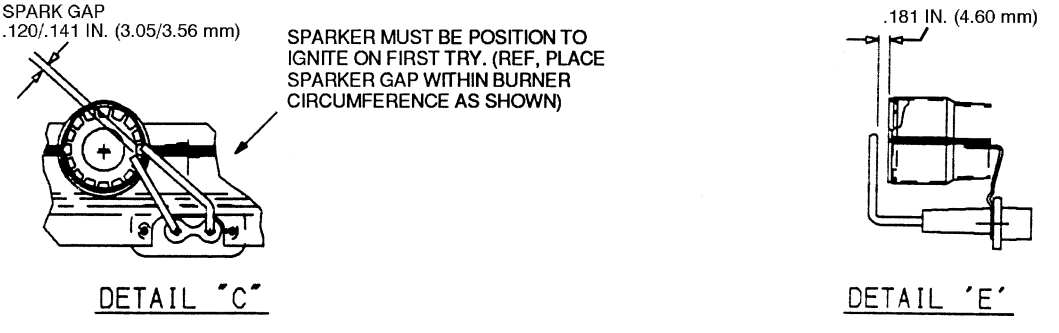


Fig. 46 — Spark Adjustment

Table 21 — LED Error Code Service Analysis

PROBLEM	CAUSE	REMEDY
Hardware failure. (LED OFF)	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24-v circuit breaker, and transformer. Units without a 24-v circuit breaker have an internal overload in the 24-v transformer. If the overload trips, allow 10 minutes for automatic reset.
Limit switch fault. (LED 2 flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame sense fault. (LED 3 flashes)	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 consecutive limit switch trips. (LED 4 flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate information.
Ignition lockout. (LED 5 flashes)	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-draft motor fault. (LED 6 flashes)	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 — White, PIN 2 — Red, PIN 3 — Black.
Rollout switch fault. (LED 7 flashes)	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lockout unit. Check gas valve operation. Ensure that induced-draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal control fault. (LED 8 flashes)	Microprocessor has sensed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.

⚠ WARNING

If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not taken.

IMPORTANT: Refer to Table 22 — Heating Service Analysis for additional troubleshooting analysis.

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

Table 22 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air, purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool down period before resetting.
	Miswired or loose connections.	Check all wiring and wire nut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in:	Check all screws around flue outlets and burner compartment. Tighten as necessary.
	Aldehyde odors, CO, sooting flame, or floating flame.	Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or reset power to unit.

Table 23 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of three-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak; repair and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low.	Low refrigerant charge.	Check for leaks; repair and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High head load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks; repair and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25 F.	Install low-ambient kit.
Evaporator fan will not shut off.	Time off delay not finished.	Wait for 30-second off delay.

Table 24 — Varislide™ Economizer Troubleshooting

PROBLEM	CAUSE	REMEDY
Damper does not open.	Indoor (evaporator) fan is off.	1. Check to ensure that 24 vac is present at terminal C1 on the IFC or that 24 vac is present at the IFO terminal. Check whether 24 vac is present at PL6-1 (red wire) and/or PL6-3 (black wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Check proper thermostat connection to G on the connection board.
	No power to economizer motor.	1. Check that SW3 is properly making contact with the damper blade. Check that SW1 is in the NC (normally closed) position. 2. Check diode D18. If diode is not functioning properly, replace D18. 3. Confirm that the economizer control board is grounded properly at PL6-4 (brown wire) and at brown terminal of the economizer control board (brown wire). The economizer motor must also be grounded properly at the negative motor terminal (brown wire). 4. Verify SW1 and SW3 are working and wired properly (see unit label diagram). 5. Check for 24 vac input at both PL6-1 (red wire) and PL6-3 (black wire). If 24 vac not present, check unit wiring (see unit label diagram). If 24 vac is found in both places, check for 24 vac at the yellow terminal of the economizer control board (yellow wire). If 24 vac power is not present, replace the economizer control board.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 18 vdc at the positive motor terminal. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	OAT or EC set too high.	1. Set at correct temperature (3 F below indoor space temperature). 2. Check OAT or EC by setting above outdoor temperature or humidity level. If the OAT or EC switches do not close, replace OAT or EC.
	Verify economizer control board is correctly wired and works properly.	1. Perform the following tests when OAT or EC is closed, Y1 is called for and damper is at minimum position. Confirm 24 vac on gray terminal of the economizer control board (gray wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Verify that SW1 and SW3 are wired correctly and working properly (see unit label diagram). 3. Check to ensure that 24 vac exists at PL6-2 (blue wire). If 24 vac is not present, check wiring (see unit wiring label diagram). 4. Check 24 vac output at PL6-10 (white wire). If 24 vac is not present, replace economizer control board.
	Check SAT.	1. After verifying that the OAT and EC settings and the economizer control board wiring are correct, check to ensure that the 24 vac terminal of the SAT has 24 vac (white wire). If OAT, EC, and control board are functioning and wired properly and no 24 vac exists, check wiring (see unit label diagram). 2. If supply-air temperature is greater than 57 F, 24 vac should be found at terminal T2 on the SAT (pink wire). If 24 vac is not present, replace SAT.
Damper does not close.	Incorrect wiring of economizer.	1. Verify that SW2 and SW4 are wired and working properly (see unit label diagram.). 2. Check diode D19. If diode is not functioning properly, replace D19.
	Verify economizer control board is functioning properly.	1. After verifying that the wiring is correct, modulate the damper to the minimum position. Remove the calls for G. 2. If the damper does not move, check for 24 vac at PL6-1 (red wire). If 24 vac is not present, check wiring (see unit label diagram). 3. If damper still does not move, check for 24 vac at blue terminal of economizer control board (blue wire). If 24 vac is not present, replace the economizer circuit board.
	Check SAT.	1. After verifying that the wiring is correct and the economizer control board is functioning properly, place the OAT or EC switch in the closed position. Place a call for Y1 and open the damper to the fully open position. Confirm that the 24 vac terminal of the SAT has 24 vac (white wire). If 24 vac is not present, check wiring (see unit label diagram). 2. If supply-air temperature is less than 52 F, 24 vac should be found at terminal T1 on the SAT (violet wire). If 24 vac not found, replace SAT.
	Economizer motor failure.	If economizer control board and SAT are functioning properly, verify that there is a minimum of 18 vdc at the positive motor terminal. If a minimum of 18 vdc is present and the motor is still not operating, replace the motor.
Economizer damper does not close on power loss.	Verify that close-on-power-loss and economizer control board are functioning properly.	1. Check voltage potential across batteries. If lower than 14 vdc, replace close-on-power-loss power supply (9-v alkaline batteries). It is recommended that you check this emergency power supply on a regular basis or whenever the filters are changed. 2. If the close-on-power-loss and economizer control board are functioning properly, check for 14 vdc or higher at the blue terminal of the economizer control board (blue wire) when power is disconnected from unit. If 14 vdc is not present, replace the control board.

LEGEND

C1 — Common Power
EC — Enthalpy Control
IFC — Indoor (Evaporator) Fan Contactor
IFO — Indoor (Evaporator) Fan On
OAT — Outdoor-Air Thermostat
PL — Plug
SAT — Supply-Air Thermostat
SW — Economizer Position Switch
vac — Volts Alternating Current
vdc — Volts Direct Current

Table 25 — PARABLADE Economizer Troubleshooting

PROBLEM	CAUSE	REMEDY
Damper does not open.	Evaporator fan not on.	Check wiring between G on connection board and indoor fan contactor.
	No power to economizer motor.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_O and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive toward open. If this does not happen, replace the economizer control module.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	Economizer control module failure.	1. To simulate high or low enthalpy, reconnect the factory-installed 620 ohm resistor across terminals S_R and +. 2. Connect 1.2 Kohm checkout resistor across terminals S_O and +. Turn the enthalpy set point to "A." The LED should turn on, indicating low enthalpy. The motor should drive toward open. If LED does not light, replace module. If motor does not drive open, check motor operation. 3. Turn the enthalpy set point to "D." The LED should turn off, indicating high enthalpy. The motor should drive toward closed. If these actions do not occur, replace module. 4. Disconnect 1.2 Kohm checkout resistor before resuming operation.
Damper does not close.	No power to economizer.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_O and +. Factory-installed 620 ohm resistor should be connected to terminals S_R and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive toward open. If this does not happen, replace the economizer control module.
	Spring return failure.	If power to unit is off and damper does not close, check for a bound linkage. If linkage is not bound, then internal spring may be broken. Replace actuator.
	Economizer motor failure.	If the economizer control module is functioning properly, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Damper does not open or close according to enthalpy readings.	Sensor incorrectly wired or bad.	To verify sensor operation, reconnect the + lead of the outdoor enthalpy sensor to the + terminal of the economizer control module. Connect a DC milliammeter between terminals S_O of the economizer control module and terminals S of the enthalpy sensor. The milliammeter should indicate between 3 and 25 mA if the sensor is operating properly. If the milliammeter indicates 0, the sensor may be wired backwards. If any other readings are shown, replace the sensor.

LEGEND

LED — Light-Emitting Diode

LEGEND FOR FIG. 47 — TYPICAL WIRING SCHEMATIC AND COMPONENT ARRANGEMENT

IMPORTANT: Refer to unit wiring label for actual unit wiring information.

AHA — Adjustable Heat Anticipator
C — Contactor, Compressor
CAP — Capacitor
CC — Cooling Compensator
CH — Crankcase Heater
COMP — Compressor Motor
D — Diode
EC — Enthalpy Control
ECON — Economizer
EPS — Emergency Power Supply (Nine Volt Battery)
EQUIP — Equipment
ER — Economizer Relay
FPT — Freeze Up Protection Thermostat
GND — Ground
HPS — High-Pressure Switch
HS — Hall-Effect Sensor
I — Ignitor
IDM — Induced-Draft Motor
IFM — Indoor (Evaporator) Fan Motor
IGC — Integrated Gas Unit Controller
LPS — Low-Pressure/Loss-of-Charge Switch
LS — Limit Switch
MGV — Main Gas Valve
MTR — Motor
OAT — Outdoor-Air Thermostat
OFM — Outdoor (Condenser) Fan Motor
P — Plug
PL — Plug Assembly
QT — Quadruple Terminal
R — Relay
RS — Rollout Switch
SAT — Supply Air Thermostat
SEN — Sensor
SW1 — Switch Fully Open
SW2 — Switch Fully Closed
SW3 — Switch Min. Vent Position
SW4 — Switch Max. Vent Position
TC — Thermostat-Cooling
TH — Thermostat-Heating
TRAN — Transformer


Field Splice

Marked Wire

Terminal (Marked)


Terminal (Unmarked)

Terminal Block


Splice


Splice (Marked)

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

To indicate common potential only; not to represent wiring.

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostat: HH07AT170, 172, 174 and P272-2783
   Subbase: HH93AZ176, 178 and P272-1882, 1883.
4. Set heat anticipator at .14 amp. For units with 2 stages of heating, set stage two anticipator at .14 amp.
5. Use copper conductors only.
6. TRAN is wired for 230-v unit. If unit is to be run with 208-v power supply, disconnect BLK wire from 230-v tap (ORN) and connect to 208-v tap (RED). Insulate end of 230-v tap.

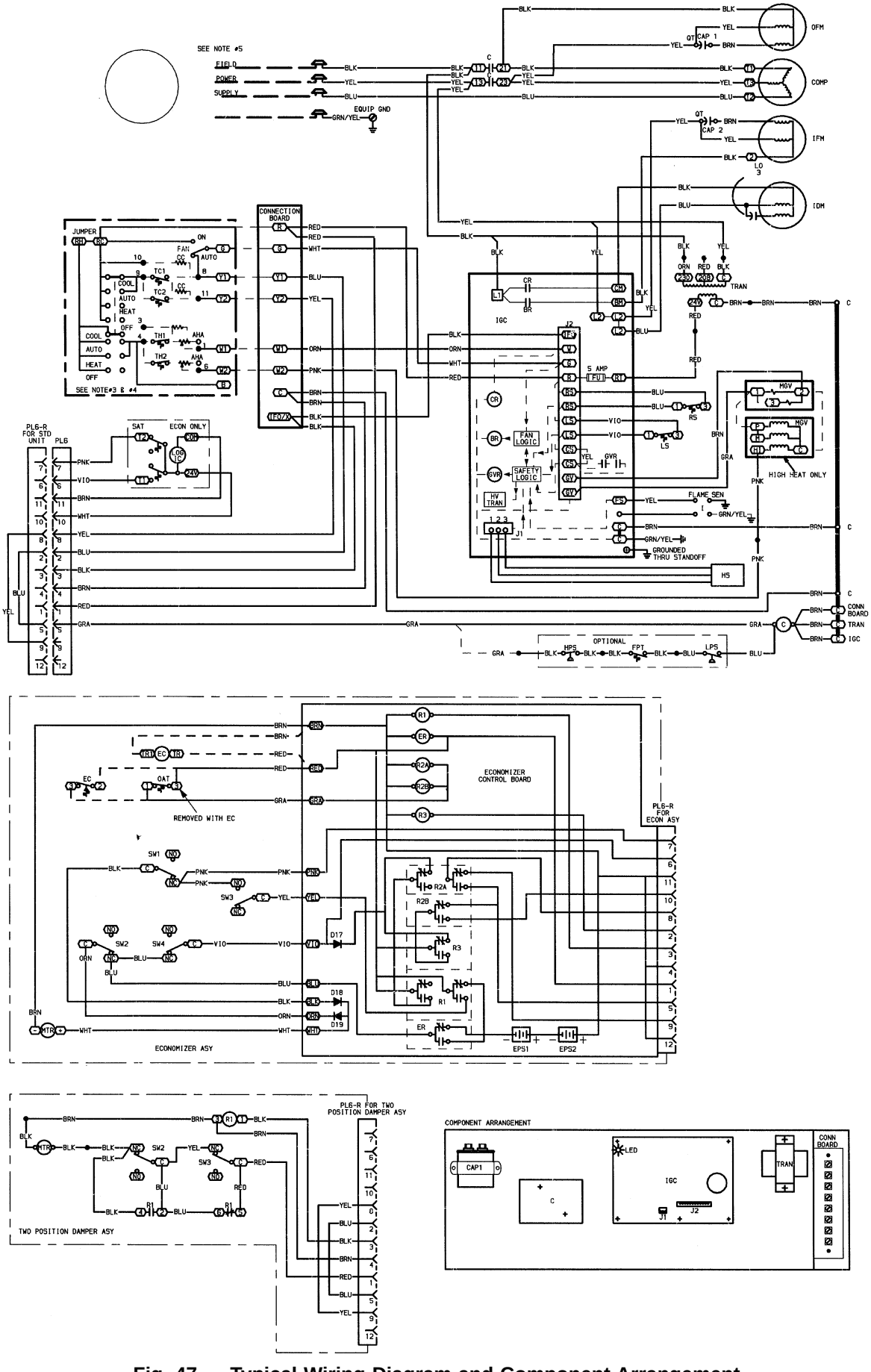


Fig. 47 — Typical Wiring Diagram and Component Arrangement

START-UP CHECKLIST
(Remove and Use in Job File)

I. PRELIMINARY INFORMATION:

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

II. PRE-START-UP (insert checkmark in box as each item is completed)

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
- ☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT INDOOR- AIR FILTER IS CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT INSTALLATION IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

III. START-UP:

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1 _____
COMPRESSOR AMPS	L1	_____	L2	_____	L3 _____
INDOOR-FAN AMPS	L1	_____	L2	_____	L3 _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ DB

RETURN-AIR TEMPERATURE _____ DB _____ WB

COOLING SUPPLY AIR _____

GAS HEAT SUPPLY AIR _____

PRESSURES

GAS INLET PRESSURE _____ IN. WG

GAS MANIFOLD PRESSURE _____ IN. WG (HI FIRE)

REFRIGERANT SUCTION _____ PSIG

REFRIGERANT DISCHARGE _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES

CUT ALONG DOTTEDLINE